Workshop

Historical Wood Utilization

Austrian Open Air Museum Stuebing, Styria, Austria
23rd to 25th of September 2011

Michael Grabner, University of Natural Resources and Life Sciences – BOKU Vienna

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Tentative programme:

Friday 23rd: Arrival in the afternoon

17:30 Dinner (Buffet) at the Museum

18:30 Opening Ceremony in combination with the Official opening of the European Heritage day (Federal Monuments Authority)

Saturday 24th: 08:30 Starting the workshop at the Museum

08:30 to 09:20 Oral Presentations

The Austrian Open Air Museum Stuebing	Egbert Poettler
Historical Wood Utilization	Michael Grabner

09:20 to 12:30 Poster presentations

10 minutes for presentation and discussion in front of the poster

Coffee-break in between

12:30 Lunch at the Museum

14:00 Visit of selected objects of the Museum

(within the frame work of the European Heritage Days)

15:30 Discussion of the "Hot Topics" of Historical Wood Utilization

19:30 Dinner at the "Mostschenke - Bäckerseppl"

Sunday 25th: 09:00 Finalising the discussions

It's the "Adventure Day - Crafts, Thanksgiving, Folk Music" of the Museum. We have the opportunity to participate the whole day.

12:00 at least one mini bus (9 Persons) will leave to Vienna airport

THE AUSTRIAN OPEN AIR MUSEUM

Egbert PÖTTLER

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Due to the great success of the first open-air Museum at Skansen, Stockholm, and the widespread interest and following foundations throughout Europe, in 1956 the International Council of Museums / UNESCO urged all nations worldwide to establish central open air museums representing the vernacular heritage of a whole country. After decades of various efforts all over Austria, the Austrian Open Air Museum was founded in 1962. The first conception for the final stage of expansion expected around 35 objects. The museum opened in 1970 with already 32 authentic historical buildings. In 2010, the Austrian Open Air Museum is one of the largest central open-air museums in Europe and was repeatedly mentioned in professional and experienced visitors' circles as "the most beautiful open-air museum in Europe".

The valley of farms

Today, 97 main objects can be visited at the museum. About 150.000 historic objects are included in this collection. The buildings represent the impressive cultural variety of Austria's provinces, from Vorarlberg in the west to Burgenland in the east. So the main types of farming houses of Austria can be visited there. But also special topics, like the buildings of alpine pasture or different handcrafts are covered. An important part next to the buildings is all rural work, like fences, gardens etc.

A valley full of nature and life

As the open air museums try to recreate a comprehensive and nearly authentic picture of the past the historic buildings are gently placed within the valley, respecting to the surrounding landscape. Rural gardens with vegetables, herbs and flowers, fields of grain and animals on the meadows are important elements of the documentation. The entire interiors are functionally presented in detail. So the visitors can walk through a historical picture, getting the impression, as if the farmers would still live there.

A valley full of knowledge

The knowledge of the farmers living there has not been documented for a time too long. It was passed only orally from generation to generation. A lot of it can be regained by visiting their houses and solving the interesting puzzles of functional indications. So this technical knowledge can be passed on to the following generations.

The former life of farmers was dominated by the raw material wood: Most of the buildings are made of wood; in most cases even the roofs. But wood can be found inside the house (furniture, cutlery, tubs, machinery …) as well as outside (fences, tools and handles, fire-wood …). That is the reason, why cooperation with wood science was started several years ago. This year, thousands of artefacts were analyzed to identify the wood species and samples for dendro-dating were started to be taken, thank to a scientific project of the University of Natural Resources and Life Sciences, BOKU in Vienna.

HISTORICAL WOOD UTILIZATION

Michael GRABNER

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Why do we talk about "historical wood utilization"?

The folklorist Blau, in 1917, stated, that the knowledge of wood properties and how to process it, starts to retreat to higher altitudes of forest lands, where the forests are the main focus of life.

Almost one hundred years after this statement, we really have lost a lot of knowledge and many skills and we are still discussing, how to safeguard it.

But why is it interesting to analyse historical wood utilization? I would like to give some examples:

*) Scientific interest

*) Safeguarding material and intangible cultural heritage

The UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (Anonymous 2003) was ratified by the Austrian government in the year 2009. Article 1 defines: "The "intangible cultural heritage" means the practices, representations, expressions, knowledge, skills – as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage." Article 2 presents the domains – amongst others: "knowledge and practises concerning nature and universe (d)"; "traditional craftsmanship (e)".

In some cases, wooden goods of collections (museums) have already been analysed, regarding wood species, dendrochronological date, folkloristic details and so on. Even these goods, which are stored within an un-endangered environment – the museum – often show problems due to degradation or suboptimal storage. Measures to protect and conserve these wooden goods have to be set up. Therefore the results achieved at the museums will be of high importance to safeguard wooden goods at farms, wooden buildings, roof constructions and so on. Due to the dendrochronological dating a better knowledge of the age of comparable wooden goods, which are still in use, will be given. That is also an important basis of monument conservation.

The EU Forest Action Plan (Anonymous 2006) wants to enhance the social and cultural dimensions of forests. That is maybe another possibility to highlight "historical wood utilization".

*) Knowledge for the future

The knowledge of special uses of seldom used wood species is rare. Mantau (2007) stated that within the European Union almost the sustainable amount of wood per year is harvested at the moment. Hetsch (2007) concluded to increase the use of wood assortments, which are not in use at the moment, to satisfy the increasing demand for raw material.

The reprise of knowledge of wood species selection is important for the future of wood utilization. The utilization of nowadays not used species for specialised wooden products can be of technological and economic interest. To develop new products using rarely used wood species, the knowledge of their properties is necessary. This knowledge can be obtained by the analyses of historical applications. The improved knowledge of historical wood utilization will help to create new niche-products; for example the use of Laburnum in gardening.

To give another example: It was started to banish plastic bags made of mineral-oil based composites. So the bag of the future might be the basket – made of wood, as we have used it for many centuries. But at the moment, just a few men/women are able to bind these baskets.

What is meant by "historical wood utilization"?

Everything!

Wood was the universal medium of material culture over thousands of years – used for fuel, housing, chemistry, metal production and much more (Wegener 1999). During the industrialisation, new products made of wood were invented – for example paper made of wood fibres (Begemann 1977). But with the ongoing industrialisation raw material and products with stable properties and quality were becoming more important. Due to these processes, the utilization of rarely used species or crooked assortments started to lose importance. Knowledge of the utilization and the properties of the raw material wood began to get lost. As a result, old traditions of handicraft-men – important immaterial cultural properties – are disappearing nowadays, which might lead to a loss of knowledge for the maintenance of wooden historical monuments, especially in the field of vernacular architecture (Johann 2007). This loss of knowledge was described for the first time at the beginning of the 20th century (Blau 1917).

A lot of different topics are summarized by the term "historical wood utilization": wood species selection, wood quality, dendrochronological dating, rarely used wood species, crooked assortments, forestry rules, the culture of wood and forest utilization, arts, crafts, material and intangible cultural heritage, the history of wood utilization, social effects of wood utilization, economy of wood utilization and so on.

At least seven scientific disciplines are attending this workshop (wood science, dendrochronology, forestry, archaeology, ethnology, architecture/building history, history). These disciplines have different scientific rules and resources to handle questions about historical wood utilization.

What resources do we have?

Again, I want to give some examples:

*) Archaeological excavations: The importance of wood can be studied over the whole time span of human beings. From well preserved findings not only wood species and dendro-dates can be achieved, also production technologies, possible tools, forest history and so on can be analysed.

*) Wooden collections in museums: A tremendous amount of wooden goods is available in all kinds of museums. Like described above, a lot of different analyses are possible. At least in Austria, little information about wooden goods is available in the museums.

*) Old literature is also a very big pool of information – even back to ancient times. Studying old literature within the field of wood science, it was obvious, that very often, the authors used figures and statements from other authors – often without any citation. The knowledge of historical wood utilization is spread over various scientific fields (ancient publications, forestry and wood science, ethnology, archaeology). So, searching literature is sometimes not easy.

*) Archives: In different archives a lot of information is hidden; like forestry rules, receipts of amounts of wood used for buildings or fire-wood and so on. Interesting information about wood assortment can be found in customs-rules.

*) Oral history and crafts-men knowledge: Unfortunately a lot of information was not written down. For the crafts-men, these details were too trivial and usually passed from one generation to the next orally. This knowledge should be safeguarded by interviews with skilled people – these are mostly old men/women with many years of expertise. In some cases movies are available. For missing techniques movies should be generated. Additionally, the analyses of wooden goods can help to understand the steps of production – for example tool marks. In archaeology, the knowledge based on experience is a well known and established way of rediscovering.

How can we foster interdisciplinary research on "historical wood utilization"?

A lot of analyses and literature are available – but sometimes very hard to find, as scientific practices are different in various fields of science. To improve the knowledge, interdisciplinary research is necessary.

But, there are still many questions, which should be discussed:

*) What questions and analyses do exist within "Historical Wood Utilization"?

*) How can we foster the communication and discussion across the different disciplines?

*) How can we bring together all available "case studies" for common analyses?

*) Where can we publish our results (to be recognized in different scientific fields)?

*) How can we link to handicraft-men (experimental archaeology)?

*) Is there a way to bridge borders due to language and local dialects?

Conclusion:

The workshop can be important to set up a scientific community dealing with "historical wood utilization". There is a chance to understand different scientific practises to set up a platform of common discussions and analyses across various scientific fields.

Acknowledgment:

This workshop was organized within the project "Historical Wood Utilization in Austria" funded by the Austrian Research Foundation (FWF – TRP00021).

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TIMBER BUILDINGS IN COLONIAL GREENLAND - DIFFUSION AND INNOVATION

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In the summer of 2010, Helge Paulsen and Thomas Bartholin took dendrochronological samples from 15 ancient timber houses in Southwest Greenland with the dual aims of finding the age of the buildings and the origin of the timber (dendroprovenance).

So far six houses from Illulisat and Sisimiut, Qasigiannguit/Ilimanaq have been processed (dendrochronological study) and the investigation has revealed that the timber came from trees grown in different areas of Northern Europe - Northern Poland, Southern Sweden, Southern Finland and Eastern and Southern Norway.

Additionally Helge Paulsen, an expert in traditional timber buildings and log structures in Norway, investigated closely the logs and notches in order to describe the types of buildings found.

Although we expected to observe Norwegian building traditions from the 18th and 19th Centuries i.e. - Scandinavian and Norwegian building methods and notches - it gave a more complex picture. In the very early houses, from the beginning of the 18th Century, we see traces of Norwegian building traditions but from the middle from the 18th Century and later, we find influences from other parts of Europe especially Central and Eastern Europe.

This ongoing work is part of ‘The Northern Worlds’ project and a cooperation between the museums of Illulisat and Sisimiut in Greenland, Vest-Agder County in Norway, and the National Museum of Denmark. ‘The Northern Worlds’ project is mainly funded by the private foundation, Augustinus Fonden, and is a scientific focus of the National Museum. This initiative hopes to generate new insights and knowledge in culture and climatic change.

HISTORICAL WOOD IN SLOVENIA

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Slovenia has a long tradition in wood processing and has been a traditional exporter of timber and wood products. Several Slovenian national, regional, and local museums among others maintain collections on past wood processing and use. The authors of this poster mainly deal with historical wood in connection to dendrochronological dating, wood identification and activities to promote wood as environmentally friendly material.

Some examples of the oldest wooden objects from the prehistoric pile dwellings at Ljubljansko barje (German, Laibacher Moor) which was mainly settled from 3800 until 2400 BC will be presented. Such objects have been preserved under water or in wet soils. Beside plentiful piles (on which the dwellings were built) valuable prehistoric wooden objects have also been found like: approximately 5600 years old bow made of yew wood (*Taxus baccata*), approximately 5150 years old wooden wheel with axis made of ash (*Fraxinus excelsior*) and oak (*Quercus* sp.) and two approximately 5150 years old logboats made of oak wood. All these items show that the pile dwellers knew how to properly select, process and use the wood.

Furthermore we will present some examples of historic rural buildings which were investigated in addition to numerous constructions of castles, churches, houses and other wooden objects. In the recent years we dendrochronologically dated over 50 rural buildings, like hay racks, houses, barns and wine cellars, all made of wood. The oldest building was dated to 1788 and the youngest to 1966. The dating helped us to find out whether the constructions are original or they have been renovated, and to include them into the list of monuments of cultural heritage of the Republic of Slovenia.

Finally we will present two books recently published to promote use of wood for buildings: "*Building with wood - challenge and opportunities for Slovenia"* of Manja Kitek Kuzman and co-authors published in 2008 and 2009, and *"Wood in Slovenian Contemporary Architecture 2000-2010"* of Manja Kitek Kuzman published in 2010. The basic purpose of the books is gathering the results of different research disciplines dealing with wood, which are all too often separated. The books are designed as interdisciplinary dialogue between experts for wood constructions. They aim to raise awareness about the benefits of wood use among the widest range of users and present the relevant Slovenian wood research achievements to the public.

HISTORICAL TIMBER RAFTING IN THE GUADALQUIVIR RIVER (SOUTH OF SPAIN)

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This research provides the first material evidence for historical rafting of timbers in the Guadalquivir River. The Guadalquivir, one of the main rivers of the Iberian Peninsula, originates in the Cazorla Mountains (south of Spain) and flows into the Atlantic Ocean at more than 400 km to the west from its source. Since Roman times, written sources had reported the transport of timber from the Cazorla and Segura Mountains down the Guadalquivir River to cities such as Cordoba or Seville. Although the transport of loose logs from the forests high up in the mountains down to the valley was well documented up until the mid-20th century, no detail accounts or evidence of further transport as rafts along the broad valley had ever been provided.

According to historical archives, the construction of buildings in cities located along the river was mainly supplied with pine (Pinus sp.) timber from the Cazorla and Segura mountains. Such is the case of the Colegial del Salvador church in Seville, a baroque construction built from a previous mosque in the second half of the 17th century. In December 2010, during the inspection and sampling of roof timbers for dendrochronological research at this church, a series of round holes filled with wooden pegs and twigs was found in several timbers from the dome over the southern transept. They did not appear to be the result of the use of the timbers in a previous building, but they seemed to be related to the assemblage of rafts in some way. The wooden pegs were identified in situ as deciduous oak (Quercus subg, Quercus), whereas samples from the twigs were taken for further wood identification at the laboratory.

A thorough literature research confirmed that these finds were related to the construction of rafts. It is documented that rafts in the Ebro River (largest river of Spain) were constructed by tying the logs together with the aid of willow (Salix sp.) twigs. These twigs were collected in spring, when sap flow had already started, and the thin willow branches were easy to bend. To make them yet more flexible, they were stuck by one end with an oak branch or a piece of an oak stem into holes made with borers on some of the timbers. The oak branch would be pressed deep into the hole to hold the twig-end and the rest of the twig would be wrapped around the oak branch to increase its suppleness. The holes we found containing not only oak bits, but also the twigs, are leftovers from this process. The fact that some of the beams were sawn right through the hole implies that the log was processed into its final shape after being used to prepare the willow twigs (probably after the raft was disassembled at its final destination).

DENDROCHRONOLOGY OF TWO GROUPS OF LITURGICAL FURNISHINGS: WHAT THE TREE RINGS REVEAL

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In 2010, two restoration projects of monumental liturgical furnishings offered IRPA/KIK the opportunity to carry out two series of exceptional dendrochronological analysis: that of the *Altarpiece of the Asunción-Coronación* in the parish church of Errenteria (Spanish Basque Country) and that of the impressive stalls of Saint-Salvator's Cathedral in Bruges.

The oak (*Quercus sp*.) stalls of the cathedral in Bruges were studied by dendrochronology in the context of a doctoral thesis (I. Geelen, *La sculpture dans le comté de Flandres autour de 1400*, under the direction of M.P.J. Martens, UGent). The stalls were moved for restoration, providing access to the back of the structure in the north wing.

The Errenteria altarpiece, also entirely in oak (*Quercus sp*.), was studied by dendrochronology in the context of a project of study and restoration by the Albayalde S.L. workshop (M. Barrio, San Sebastián). Completely dismantled for restoration, tree rings of sculpted elements and planks of the case were exposed without requiring destructive sampling.

While dating is clearly the best known application of dendrochronology, recourse to this discipline in the context of an encompassing study of well-defined questions provides much additional information related to manufacturing techniques and the production context.

Description of the available trees, provenance and selection of material depending on function, coherence or heterogeneity within the ensemble are some of the many aspects documented by dendrochronology during the study of these two groups.

The poster which be proposed in the workshop *Historical Wood Utilization* will present a part of the results brought by the dendrochronological study of these still current projects.

THE ENCYCLOPEDIC FOREST: READING J. G. KRÜNITZ ON WOOD

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The *Oekonomisch-technologischen Encyclopädie*, by Johann Georg Krünitz covers almost 144,000 pages. It is a virtually inexhaustible source describing the status of technical knowledge at the beginning of the lndustrial Age. The first volume of the encyclopedia was published in Berlin in 1773, volume 242 – the final volume – almost 100 years later in 1858. Today the full text of the encyclopedia – already known as "*The Krünitz*" in the author's lifetime – is freely accessible online at www.kruenitz1.uni-trier.de.

The encyclopedia exemplifies the utilitarian ideals and spirit of the Enlightenment: its purpose was to ensure the utmost distribution of scientific knowledge for the benefit of the state and its population. The work focuses particularly upon the practical aspect of the gathered data.

"*The Krünitz*" provides extensive and multifaceted information on wood and its related subjects. Examples from the treatment of trees, of several items made out of wood and of forest management are used to discuss how wood use was conceptualized in an 18th century encyclopedia. The entry 'wood' alone covers 492 pages, more than half of one volume, further information is contained in a number of additional entries. A search query on the terms 'holz' ('wood') and 'hölzern' ('wooden') in all 242 volumes results in approximately 50,000 hits. The characteristics and use of the lumber of every domestic tree and shrub are described in the specific entries. Entries on many contemporary wooden products specify what kinds of wood were used in their construction.

Forestry management receives extensive coverage in the entries concerning wood. Krünitz considered the emergence of sylviculture to be a significant development, much needed at the time given the already large and increasing demand for wood as a raw material. Wood's contemporary significance is demonstrated by the many articles on the cultivation and harvesting of timber contained within the work. He placed high priority on the systematic and structured cultivation of trees and opposed the traditional utilization of wood in the pre-industrial peasant economy. According to Krünitz, with the exception of hunting, forests and woodland were a resource to be used exclusively for timber production.

Krünitz was not preoccupied by the growing concerns of the late Eighteenth Century that existing woodland might not be able to deliver sufficient amounts of timber to meet demand. He was convinced that timber supply could be guaranteed for future generations by new and more economical methods of forestry management, if the authorities took appropriate corrective action.

Reading "*The Krünitz*" is not only a valuable source of historical information but can also be highly entertaining.

WOOD UTILIZATION IN HISTORICAL CHURCH ROOF CONSTRUCTIONS IN AUSTRIA

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The present study of wood utilization in historical church roofs in Austria is based on a data set of 3.443 samples from 223 objects in Salzburg, Carinthia, Upper Austria, Lower Austria and Styria between the rivers Danube and Drava.

The dendrochronological dates of 1.982 samples cover a time span from the early 12th to the middle of the 20th century, but almost 95% date between 1350 and 1750.

The aim of the investigation is to find out (1) which tree species were used, (2) whether there are regional differences or (3) a change over time and (4) if there is a relationship between the different types of construction elements and wood species.

The data base analysis revealed that (1) almost 82% of all elements were made of Norway spruce (Picea abies) followed by silver fir (Abies alba) with more than 11% and larch (Larix decidua) (5%). The remaining 2% are shared by oak (Quercus robur and or Q. petraea) and pine (Pinus sylvestris and/or P. nigra, P. cembra).

For regionalization (2), the data set was split into three groups according to the elevation of the churches. Norway spruce is the dominating species in all three classes, but the silver fir and larch proportion changes with elevation. At the lower-elevation sites (up to 500 m a.s.l.) the relation silver fir to larch is 6:1, at the intermediate-elevation sites (500 to 1.000 m a.s.l.) it is almost 1:1 and at the high-elevation sites (more than 1.000 m a.s.l.) it turns to 0:1. Since this reflects the natural distribution of tree species in Austria, one could suspect that the wood for the churches was taken from surrounding forests. Another indication supporting this hypothesis is that the average number of tree rings per sample increases with elevation.

To depict the development of wood species utilization over time (3) from 1350 to 1750, the dated elements were clustered into eight 50-year time slices (1350-1399, 1400-1449 etc.). No significant changes could be detected. Norway spruce – followed by silver fir and larch – always was the most important species.

There seems to be no relationship between construction elements and wood species (4). By dividing the data into groups according to construction element (post, beam, rafter, strut) the tree-species distribution is the same as described for (1) and (2). But interestingly, the average number of tree rings per sample seems to correlate with construction element: Posts and beams show an average number of 72 rings, rafters have 64 rings and the mean ring number of struts is 57 rings. Hence, one might conclude that older/younger (and therefore presumably bigger/smaller) trees were used for construction elements with bigger/smaller dimensions.

THE VARIETY OF WOOD SPECIES USED IN THE „SCHNEEBERG REGION“, LOWER AUSTRIA

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In pre-industrial times an understanding of how to use every single wood species was self evident. Whenever possible, wood has been used according its specific properties. This almost lost knowledge can be rediscovered through determining the wood species of the inventory of museums.

The “Waldbauernmuseum” in Gutenstein demonstrates the economic and the social history of the region around the mountain “Schneeberg”. The best part of the region is covered by forest. Therefore wood has always been important for people living there and was part of the development of industries and special techniques. People have learned how to use wood in the most efficent way and how to trade wood most profitable. In the museum all crafts developed in this region are shown, such as carpentry, wainwright crafts, barrel making, sawing, basket making, calk hole burning, agriculture and “Pecherei”. Wood has been necessary for all of them.

Identifying wood species in the „Waldbauernmuseum“, the systematic use of different wood species became apparent. In total, 1400 wooden parts were analysed. Thereby 32 different wood species could be distinguished; nine of those could be addressed as shrubs. For the interpretation of the results, the origin of the object and the craft in which it was used were taken into account. It could be demonstrated that the properties of different wood species as well as the occuring stresses and strains which the object was exposed to in use, were important criteria for selection of the wood species.

10% of all identified wood species can be named as shrubs, thereunder Cornus mas, Corylus avellana, Crataegus spp., Viburnum spp., Berberis vulgaris, Buxus sempervirens and Juniperus communis. Listing the specific gravity of all identified wood species, those of shrubs are ranked at the very top. Therefore they were priorly used for tool handles and for small parts of machines as spindle, axels, reck teeth and reinforcements.

One third of all inventory parts were made out of beech wood. But, these were usually not specialised parts. For specific requirements other wood species have been used. Corylus avellana was found in 33% to build frameworks for transportation and 50% in basketry. 50% of the planers were made out of Carpinus betulus. Especially the wainwright crafts used the more elastic, but mechanically strong species: Fraxinus spp., Ulmus spp. and partially Acer spp.

All these examinations made evident that people of former times were aware of the advantages and disadvantages of every wood species. Therefore they were able to use wood in the most efficient and profitable way.

HISTORICAL WOOD UTILIZATION IN THE DISTRICT OF OPAVA IN THE MIDDLE AGES

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The historical centre of Opava (a town in Silesia) is one of the most significant archaeological finding sites in the Czech Republic, at least in the last decades. Wooden artefacts found in Opava are usually in a good state, which makes it possible to both determine their species and perform a dendrochronological analysis. During the extensive 5-year research 616 wooden samples from various objects and constructional elements were analysed microscopically. The analysis showed that 474 samples (77 %) were from softwood and 142 samples (23 %) were from hardwood. The most represented wood species was fir, which was identified in 251 samples. The wood of fir was used both for building or construction purposes (beams, posts, manger sides, etc.) and for wooden tools and containers. Spruce wood (78 samples) and larch wood (71 samples) were identified mainly in samples included in wooden bowls made of parts (veneer, bottom). Wood of pine (32 samples) was probably often used for the manufacture of wooden objects for making fire or light and as a construction material, e.g. for constructing wooden drilled piping. Thanks to its high durability and mechanical properties, the most represented hardwood was the wood of oak (58 samples), which was used for building and construction purposes, especially for exposed elements (braces, fixing pins, manger sides). An interesting find was a turned bowl which was made from ash. Besides the listed species, also Ulmus, Cerasus, Fagus, Tilia, Acer, Alnus and Carpinus were identified. The wooden finds prove that wood was a material important for life.

Acknowledgements

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STUDY AND IDENTIFICATION OF ANCIENT EGYPTIAN WOODS: THE FUNERARY MODEL'S OF LYON MUSEUM

Victoria ASENSI AMOROS[1], Catherine LAVIER[2], Gersande ESCHEBRENNER[3], Sandrine PAGES-CAMAGNA[4]

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The funerary Models of the Middle Kingdom in Egypt are a very particularly statuary Group. These small statues of polychrome wood were placed in the tombs to accompany the death person in the eternity and given to him, in a magical way, all the comfort and belongings he needs for a comfortable life. The status represented boats, agricultural and artisanal scenes, storage food, etc.

The study models are done in order to understand the material employed the assemblage and the construction techniques. Different analysis techniques were employed: wood anatomy, tools traces, scanning observation and chemical study. The aim is to compare the results with other collections in order to understand the artist practices and to try to identify the different artist ateliers in Egypt.

The wood Models are the elements of the funerary furniture at the end of the III millennia BC and the beginning of the II millennia BC. Their function was to provide to death person all the necessary things for a good life: transport, clothes, food, servants… It is a new way of workers representation (brewers, bakers, musicians…) used on the tombs of the important persons at Memphis in the IV and V dynasties. The end of the VI dynasty, and specially the First Intermediate Period (VII-X dynasties), are a time of important mutations in the funerary practices. The elite wish to be buried surrounded by diversified furniture and protected by a new funerary texts, the Sarcophagi Texts', who appeared in some coffins dated to the First Intermediate Period and maybe to the VI dynasty. The most ancient wood models known come fort the elite tombs of the VI dynasty in The Middle Egypt, at Meir. Contrary to the calcareous models who shows only one person cooking or playing music, the use of wood allows the use of more persons and scenes and the number of models increase, some tombs at the end of the XI and the beginning of the XII dynasty can have around 30 models.

The current study is about 18 funerary models conserved in the Lyon Museum and they come from two localities in Egypt : Saqqara (35km south to Cairo) and Assiout (Middle Egypt). The aim of our study try to precise the place of fabrication, the workshop in Egypt were the models were down. Different analysis techniques were employed in order to understand the material: wood anatomy, tools traces, scanning observation and chemical study. The stylistic analyse were also used in order to try to define the region and the artisans group who constructed them, later we will try to refine the chronology.

At the moment the results of the wood anatomy studies shows the important use of indigenous species: *Ficus sycomorus* it's the most important wood employed and, only in two cases, we have *Acacia* and *Tamarix*. Only one importation tree was used, the cedar (*Cedrus sp*.) its specially used for the bases of the scenes and for the small and articulate pieces.

The cooperation with the Hospital Centre at Lyon gives as a precious information's with the scanning in 2D and 3D; the internal and external morphology of the tree, the traces tools, the

assemblages, the number of pieces… The correct interpretation of those date will bring us the restitution of the object in the tree, the tools restitution, the different people working at the time on the object…Chemical analysis gives us information's about the cover wood material employed, the different composition of the pigments, etc.

Working is in progress now for the Lyon collection and we hope, in a second step of the work we try to compare ours results with the few models studied now in the world.

WOOD IN MEDIEVAL BINDINGS OF MANUSCRIPTS AND INCUNABULA OF EUROPE

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The appearance of the book in Western Europe such as we know it, date of the end of the Antiquity: the *codex* replaces the *volumen*. It is not any more a roller but bound leaves. To protect texts, this assembly evolves and, very fast, small wooden boards are sewn to leaves and covered, mostly of leather. During almost a millennium, the wood is thus an integral part of manuscripts and *incunabula*. The printing office, the technological headways, the needs of distribution and the practical aspects will quickly make replace the wood of the binding by cardboard covers till the beginning of Modern times. The municipal and national libraries of France are in charge of preserving these books which reached until us. We count some 33000. The Ministry of Culture decided to make the complete inventory of these libraries in the 1990s. Then, between 1999 and 2005, scientific studies were able to be led and 5 precious collections were already examined. The study of the wood of these bindings allowed to observe 3000 books and the results supply invaluable information on the identification of the wood, its dating, its implementation and its origin. The methods, the protocols, the techniques and already acquired results will be presented here with a development of dynamic management of these data and metadatas.

FROM KISO TO PARIS: THE STORY OF A WOODEN JAPANESE HOUSE. PART I

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Within the framework of a research work in ethnology on Japan, Jane COBBI, researcher to the CNRS, inherited from a house wooden mountain to KISO, in the prefecture of Nagano. She managed to make it transport in France. Dating from the XIXth century, it is this day the only Japanese house in France. After many adventures, its recontruction took place in July, 2010, in the Zoological garden of the Bois de Boulogne, on Paris. Thanks to numerous collaborations, an architect and Japanese carpenters came specially in France to build it. It allowed us to follow the construction site by realizing movies and scientific pictures about the know-how of these craftsmen. We took advantage of it to make more than 250 wooden samples in the form of carrots, of cuttings of not used wood and clichés of tree-rings in situ. It is an once-in-a-lifetime opportunity to understand the construction of this house on the choice of wood, their quality, their origin, the re-uses, repairs and additions, but also to establish local chronologies of Japanese wood. This exceptional story will be told here and constitutes the first episode.

FROM THE VILLAGE BACK TO THE FOREST: TIMBER SUPPLY HIGHLIGHTED BY DENDROTYPOLOGY

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Within the scope of pile-dwelling research, dendrotypology has been developed since the 1980's as an attempt to sort large timber sample sets known for the high variability in cambial age and diversity of growth patterns. Combining parameters from dendrology, tree-ring analysis and wood technology, this method plays a key role in the dating process, the chronology building and the architectural definition. Furthermore, dendrotypological assemblages highlight the strong relationship between settlement development and the former practices of woodland management. Additionally to the assessment of timber sources and stand structures, ecological information e.g. abrupt growth changes and effects of the cockchafer reproduction cycles can be added to the socio-economical aspects for a better understanding of the environmental changes in the surrounding forests. Finally, the woodland development derived from dendrotypology can be used as background for the regional climatic reconstruction.

An illustration of this approach is centred on the project Sipplingen-Osthafen (financially supported by the German Research Foundation), dealing with the investigation of repeated lake-shore settlement cycles during the Neolithic period between 3900 and 2400 BC. Special focus of research is set upon interferences between settlement dynamics and environmental changes in a small area enclosed in steep slopes of geological faults. On the basis of 3600 oak samples, a succession of 17 occupation phases is known up-to-date, which are accompanied by settlement relocations, demographic fluctuations and architectural adaptations. With reference to historical models of woodland management, dendrotypology enhances long cycles of woodland use from the initial clearings over intermediate coppice formations until the final forest degradation underlining the intensity of settlement activities. A comparison with neighbouring sites point out the same development at regional scale. From an ecological perspective, this observation seems to be in agreement with cockchafer flight effects in oak tree-ring patterns.

UTILIZATION OF DIFFERENT WOOD SPECIES –ANALYSIS OF OLD LITERATURE

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Since a very long time, wood and the by-products of the forest have been important raw materials. It was early realized that in order to gain the optimal usage it would be inevitable to study the wood properties.

The field of applications ranged from the traditional use as construction timber, to the utilization in the most various trades, from the wainwright and joiner until the watchmaker. The strain apparently varies depending on the application; a high durability and resistance to degradation are a requirement in hydraulic engineering for steadfast buildings. On the other hand for the production of matches, these properties are hardly of any attention.

Wood properties and utilizations of different wood species in old literature were reviewed, considering the period between the early 19th century and the Second World War.

The usage of wood has always been linked to the material properties. For different applications there are different requirements. This seems to be especially interesting for rarely used wood species. The question is whether the connection between the properties and utilizations is obvious and therefore described in literature. Another important influence when looking at wood use is the availability of certain types of wood.

83 wood species, structured in 68 hard wood species and 15 soft wood species have been reviewed. The characteristics of the species were found in literature which was published between 1812 and 1939.

For each book a detailed, so called literature assortment in tabular form was made. These assortments contain every mentioned wood species together with each property and utilization. Later the literature analysis is generated out of the literature assortments. In the literature analysis the information is reduced and condensed, an overview is generated to represent properties and utilizations clearly. In fact the analysis is an illustration of frequency of mentions.

In summary, this approach points out the most common and important properties and utilizations for each wood species and also proofs the connection between utilization and property.

WOOD SPECIES IN THE COLLECTION OF FINDS FROM THE VILNIUS LOWER CASTLE

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In 1988 – 2009, during investigations into the Vilnius Castles site and the Palace of the Grand Dukes of Lithuania more than 1700 archaeological artefacts from the 14th – 18th century containing waterlogged wood were collected. In 2004, the analysis of wood species was started. Wood species was identified using the standard micro-analysis method (according to Hather, 2000; Panshin, De Zeeuw, 1980; Schweingruber, 1982). A small size of samples, deterioration of wood, and sometimes compression or mineral replacement of the cell tissues posed major difficulties in the analysis.

Between 2004 and 2009, wood species of almost one third (a total of 572 items) of the wooden and partly wooden artefacts were determined. Eighteen wood species were found. Most often the artefacts were made of pine (32.34%), oak (22.03%), maple (11.71%) and ash (9.62%) wood. Less common wood species were birch (5.77%), lime (4.02%), spruce (2.8%), elm (2.62%), and boxwood (2.1%). Less than 2% of the artefacts were made of aspen/poplar (1.22%), willow (1.22%), hazel (1.05%), *Rosacaea* (1.05%), fir (0.87%), alder (0.52%) and spindle tree (0.35%).

Different wood species prevail among the artefacts for various purposes and made by means of different techniques. According to the processing technology, pine and oak items were most often made by way of cutting or sawing. Maple prevails among the carved artefacts. Turning masters most often chose ash, somewhat more rarely maple. Spruce, fir and aspen (poplar) belong to the species that were used less frequently for turning. Oak, hazel willow, elm trees, ash and birch were used for making bent items or items made of branches (wheel rims, hoops of stave-built containers, bows, brush wood). Priority was given to different wood species when making articles for different purposes. The wood species spectrum shows that wood masters had a good knowledge of the properties of the material used and chose wood according to the purpose of the product and peculiarities of its manufacture.

Artefacts made of alien tree species – boxwood, fir, cork oak –testifies to the fact that trade in wooden goods was carried on with distant countries during the medieval and post-medieval period.

RECONSTRUCTING FOREST ACTIVITIES IN PREHISTORIC HALLSTATT, AUSTRIA

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The prehistoric salt mine in Hallstatt together with its burial ground is one the most prominent archaeological sites in Austria. Due to the excellent conservation with rock salt, a great number of organic material, primarily wooden artefacts, have been found inside the mine.

These wooden findings are mining timbers, illumination strands, transportation bins, bowls, cups and tool handles. Studying small wooden artefacts as bins and lightning bands shows the type of woodworking in the Bronze Age. The way bins and in particular the staircase was constructed clearly demonstrates the high technical standard and workmanship present at that time.

In consequence of the topography of the surrounding region, mining timber was transported to the salt mine only within a restricted area. This area is bordered by steep rocky slopes in the north, south and east and by the timberline in the west. The elevation ranges between 900 and 1500 m asl. Mainly spruce (47%) and fir (43%) was used for mining timber. Small number of samples belonged to beech (8%), maple (1%) and larch (1%). When compared with the expected forest ecotype, a far high proportion of beech-wood can be expected. However, we hypothesize that beech wood was mostly used as fire wood. The small number of larch found in the mine indicates that almost all larches were used for housing.

Inside the mine the prehistoric litter covers thousands of lightning bands. These bands were split-off from knot free stem region, with a length up to one meter. That means, that the wood origins from the outermost knot-free part of the bud log of old trees grown in a closed canopy site. Almost 100% were made of fir, which is remarkable in the case of the lightning bands. Usually they are made of pitchy pines or spruce to ensure proper burning.

Most of the transportation bins were made out of overgrown fir stumps. The lowermost part of the tree was not harvested, but left in the forest to gain overgrown wood, which texture is undirected, sometimes growing in circles. This tissue is more resistant against splitting.

Reconstructing the tree diameters from mining timber, lightning bands and bins it was possible to see that the all diameters available from the complete tree were utilized: the uppermost part, of low dimension was used for mining timber, the knot free part of the tree was split to get lightning strands and the lowermost part was left in the forest in order to harvest transportation bins a few years after.

WOOD UTILIZATION IN THE CITY OF ‘S-HERTOGENBOSCH (SOUTHERN NETHERLANDS) IN THE LAST MILLENNIUM

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The city of ‘s-Hertogenbosch is situated in the southern province of Noord-Brabant in the Netherlands. An existing settlement was granted city rights in AD 1184. Its strategic location on a slight elevation in a swampy area along several waterways provided ample trade connections with other towns, while its boggy surroundings made it easy to defend. These conditions favored the expansion of the city and it soon developed into one of the main commercial hubs of the duchy of Brabant. The growing city required raw material to supply its expansion and for everyday domestic use, as well as selected (semi)finished products for its craftsmen and merchants.

Part of the history of the city is reflected in the preserved wooden remains that were encountered during archaeological excavations and investigations of historic buildings conducted in the last three decades. Recently, the dendrochronological research and wood identification of numerous wooden samples stored at the facilities of the Municipal Archaeological Service have shed light on different aspects of the trade and use of numerous wood species throughout the centuries. This study presents an overview of various aspects of wood utilization in city of ‘s-Hertogenbosch during the past millennium.

Dendrochronological data collected from around 500 construction timbers found in waterlogged soils or historic buildings revealed a change from local to imported oak around the 13th century, coupled with a decline in quality of local oak in (early) medieval times. Subsequently, conifer species such as Abies alba and Picea abies originating from increasingly diverse areas were introduced as construction timbers in the post-medieval period.

Numerous excavated cesspits provided the abundant samples for wood identification. After having served their intended purpose, cesspits were emptied and then filled with refuse from nearby houses and workshops. Around 1.700 individual finds were identified. The majority was made up of small sized generic or fragmentary remains resulting from everyday activities of (post-) medieval households. Especially, the discarded, charred leftovers from fireplaces show a wide range of species, which suggests indiscriminate use for firewood of whatever species that were available in and around the city. Household utensils show less variety is species, indicating selective use of locally available resources. Objects for daily use were also imported from other parts of Europe. Provenance based on dendrochronological results and wood identifications for domestic objects show trade networks extending to Scandinavia and the Baltic. Here as well, a limited range of species was used. The most exotic wood species by far were found in a cesspit associated with an early 16th century workshop for the manufacturing of knives, a typical product of the city of ‘s-Hertogenbosch. Refuse from a workshop show that an assortment of carefully selected and often expensive wood species was used to make knife handles. Esthetic characteristics such as color and the presence of burls were sometimes preferred above its suitability for woodworking. Most species used for this purpose were not indigenous to the Netherlands and had to be imported from the Mediterranean area or the newly discovered Americas.

HISTORICAL UTILISATION OF WOOD IN THE SCHNEEBERG REGION /LOWER AUSTRIA

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Around the Schneeberg, due to the existence of extensive woodlands and the lack of arable land, farmers specialised on producing wooden goods, both semi-manufactured and completed, for the surrounding settlements including Vienna. Historical data from the 14th century on until the middle of the 20th century is proving this specialisation. Many wood-working techniques have changed little through the centuries but have become obsolete within the last 70 years. Luckily in Gutenstein, near the Schneeberg, there is a museum, the Waldbauernmuseum Gutenstein, dealing exclusively with these specialised “wood-farmers”. Founded in the mid 1960´s its focus lies not only on collecting regional wooden goods, but also collecting all the tools, gauges, models and jigs necessary to manufacture the goods, making the Waldbauernmuseum a unique institution. Although the 87 year old co-founder of the museum, Hiltraud Ast, has written several books and directed 26 films dealing with wood utilisation, there is still a lot of archive-material to be worked off with her and secured in a database. This database, consisting of word files with descriptions of wood-working techniques, pictures, details about historical trading and oral history, is already online but has not yet been completed (www.holzverwendung.at).

The future challenge is how to keep these techniques alive, so that we can hand over “not only the ashes, but also the flame” to our children.

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