The earliest Pile Dwelling settlements on the shores of lakes and in bogs of southern Germany date to the late 5th millennium B.C. according to absolute 14 C-dates. Aichbühl, a site at the Lake Federsee, provided a 14 C data series around 4260 BC. At Lake Constance, the earliest Pile Dwelling settlements of the Hornstaad group provided dendro-chronological dates from 3917 BC on. Ehrenstein at the Blau river, a settlement of the Schussenried culture near Ulm at the Danube river dates back to 3955 BC (fig. 1 – Mainberger 2015, p. 100; Häfner et al. 2016).

New sites at the Lake Constance near Bodman, Reichenau-Hegne and Konstanz-Wollmatingen, as well as long known settlements near Singen – here the cultural layers were very well preserved in a river loop – and Mühlhausen west of Lake Constance provided finds, structures and dates between 4900 and 4500 BC (Hald 2019).

Early Neolithic settlements are found on mineral soils (Seidel 2016, p. 52). According to radiocarbon data, these are the settlements of the oldest Linear Pottery and the cultural group of La Hoguette dating from 5500 BC. The Greek lake settlements of the Neolithic around Amindeon are even older (Touloumis et al. 2003; Chrysostomou et al. 2015). Comparisons of wetland settlements in Greece, southwest Germany and Switzerland are therefore only possible from around 4400 BC.

House layouts and settlements in southwest Germany between 4300 B.C. and 850 B.C. show different forms and settlement concepts (fig. 2 – Schlichtherle 2011, p. 16). In the following, the oldest finds at Federsee and Bodensee in Germany will be discussed.

**Fig. 1:** Distribution map of early Pile Dwelling sites (cultural groups of Lutzengüetle, Schussenried, Hornstaad) along the Danube river and the Federsee region in south-western Germany, the western part of the Lake Constance and the Rhine Valley in western Austria.

**Fig. 2:** House-forms in the Pile Dwelling regions of south-western Germany and northern Switzerland in chronological order.
Lake Federsee lies north of Lake Constance and has lost much of its original surface after the Ice Age (fig. 3). The digging of peat briquettes as fuel for the railway and private households at the beginning of the 20th century was the reason for the extensive uncovering of settlements, dugout canoes (fig. 4 – Reinerth 1936, table XLVIII.1) and paths/track ways (fig. 5) from the Mesolithic to the Iron Age. In these endangered wetlands around Lake Federsee and especially in its southern basin, the Prehistoric Institute of the University of Tübingen investigated settlements of the Aichbühl Culture in a large scale from 1919 onwards (fig. 6, 7 – Schmidt 1930/1936/1937). According to today’s standards, the excavation areas were very large, too large. However, the documentation of the examined findings was very progressive: excavated and thus uncovered areas were photographed by square meters from a ladder. Efforts were made to record chronological horizontal developments in the settlements in order to determine the settlement history and building constructions.

Fig. 3: Lake dwelling regions in south-western Germany. Federsee and Lake Constance.

Fig. 4: Dugout canoe of the Latène period (site Steinhauser Ried, Federsee bog), 1921.

Fig. 5: Trackway (Federsee bog), 1929.

Fig. 6: House-floor and stratigraphy (site Riedschachen I, Federsee bog).
The earliest prehistoric lakeside settlements of southern Germany and the reconstruction activities in the Pfahlbaumuseum Unteruhldingen (DE)

The houses were arranged with the narrow side towards the lake (Reinerth 1936, p. 85), their substructures were controversially discussed. The construction of walls and ovens and the furniture were of special interest (fig. 8–10 – Reinerth 1936, p. 94 and tables XVI.1, XXIV).

At the excavation site the finds were documented, washed and assembled (fig. 11 – Schöbel 2011, p. 61). From there they went to the museums of Bad Buchau, Tübingen and Stuttgart and were always exhibited shortly after the excavations.

The archaeological investigations at Lake Federsee were also the birth of a scientifically oriented archaeology. Although there had already been numerous investigations into archaeological zoology, anthropology and botany in the 19th century, above all in Switzerland.
Now, however, through bog-geology under C. A. Weber from Berlin the entire range of instruments of modern archaeology was used by the protagonists of the Prehistoric Institute in Tübingen, such as R. R. Schmidt, H. Reinerth and G. Kraft: geology, sedimentology, pollen analysis (fig. 12 – Schöbel 2011, p. 87), environmental reconstruction; questions of architecture and cultural affiliation were posed. It was considered important to test interpretations and hypotheses by means of graphic reconstructions (fig. 13 – Reinerth 1936, p. 85, fig. 32) and 1:1 house models (fig. 14 – Wildes Ried 1919) in order to find new scientific approaches and to strengthen interpretations in the falsification process. After the excavation, reconstructed houses were inhabited experimentally by archaeologists and films were produced as information media about prehistoric periods for the scientific education of students and the entire population.

With a holistic and pedagogical approach to the interpretations, an attempt was always made to link the results of the excavations with the presentation in museums and to the public. New outdoor and indoor museums were created, including the one in Unteruhldingen on Lake Constance (fig. 15). Here was tried to make the archaeological findings visible and experienceable. The topic was popularized with great success. In the years after WW I science took a critical view of this, as it did not correspond to its understanding of knowledge processing. In most cases, the state's research mandate and not the mediation mandate still had top priority. But in a time without

▲ Fig. 12: Botanical, geological and sedimentological analysis at the Federsee sites.

▲ Fig. 13: Reconstruction drawing of the Neolithic bog settlement of Aichböhl.

▲ Fig. 14: Experimental reconstruction of a Neolithic house at Wildes Ried, 1919.

▲ Fig. 15: 1931: aerial photograph of the Lake Dwelling Museum Unteruhldingen with reconstructions of the Neolithic houses of Riedschachen (left), Wasserburg Buchau (center, on the platform) and bathhouses similar to Pile Dwellings (right).
clearly organized and legally defined state protection of historical monuments this new type of museum also served to find sponsors (private entrepreneurs, industry and patrons) for research and excavations. Many archaeological institutions as we know them today were not yet fully institutionalized and developed.

Experimental archaeology was used to gain insights into Stone Age technology. The medialization of the topic of Pile Dwellings produced a social benefit for prehistoric archaeology. But it also led to its politicization. The treatment of the earliest cultures led to an upswing in science, schoolbooks and to new university institutes in Germany. On the other hand, there was also an abuse of science by nationalist politicians and researchers within the concept of a “pangermanism”. Starting from Scandinavia, according to the theses of Oscar Montelius and Gustaf Kossinna, it was thought that even the Stone Age Aegean world would have been settled by “Nordic” people (fig. 16 – Klagges 1938, p. 214). Today we know better (fig. 17 – Gronenborn 2014, p. 13).

From an archaeological point of view, the research approaches of 100 years ago were successful. The latest methods were used but the political intentions and interpretations were wrong. The natural sciences provided the decisive results for this area, not the humanities as in previous periods of historical research.

After 1945, research came to a halt at Lake Constance and Lake Federsee in Germany. From 1952 Oscar Paret excavated near Ulm with the site Ehrenstein for the first time since many years a bog settlement. On the shores of Lake Constance Helmut Schlichtherle of the Archaeological Service of Baden-Württemberg started in 1972 surveys and excavations during a particularly low water level in wintertime (Dieckmann et al. 2006, p. 21). Heated tents ensured that the ground could not freeze at extreme winter temperatures (fig. 18, 19). Sludge/washing equipment enabled the screening of sediments. These excavations – carried out in a chess board...
system per square meter - yielded important results (Dieckmann et al. 2006, p. 29–35). Construction elements could be drawn and documented in situ. Analyses of palaeobotanical, sedimentological and dendrochronological samples were done immediately after the excavation. It became possible to determine the building history in detail, house by house. This was not easy. Complex overlays of the findings, not always well preserved woods or eroded sediments complicated the interpretations. Nevertheless, dozens of settlement analyses were realized as a result of the work carried out by the specialists of the Archaeological Service, which made it possible to compare the evolution, construction and abandonment of settlements. The questions developed steadily over 40 years of research. Statements on settlement dynamics and the network of simultaneously existing settlements are possible today. The history of early settlements is currently described more by dendrochronological and biological methods than by archaeological typology. This does not mean that one can do without large excavations today. However, pollen analysis, the examination of woodworking techniques, pollen analytical, zoological and sedimentological studies become more and more important for the evaluation of historical processes even in small scale excavations (fig. 20 – Dieckmann et al. 2006, p. 14).

Village plans can give us information about the function of houses and the social structure in the settlements. Was fishing or trade important? Are there any corresponding buildings that could be interpreted as residential or farm buildings? Were all houses populated at the same time or does the plan show a building development of 20–30 years? Was there a boss in the village or was it an egalitarian society with specialists and various craftsmen? These are questions that can be well discussed with a differentiated methodology and lead to new insights. A good example is the question whether pearl manufacturers existed in Hornstaad-Hörnle IA on Lake Constance that Marion Heumüller pursued in her dissertation (Heumüller 2009). The analysis of fragments of small white lime pearls (fig. 21) showed that raw materials could be found in the waste of many houses, whereas intermediate products with started drillings were found only in a few houses (fig. 22). It seems that a joint production of pearls was established. But only in one house the finely drilled finished pearls were found. This allows the thesis that the finished goods were collected and stored there. It would also be conceivable, however, that the “pearl master” who gave the semi-finished products the finishing touches worked in this house. We owe these interpretation possibilities to the precise recording of the lime tube beads on the site of Hornstaad. Observations of differences and synchronicities in the artefact distributions are extremely exciting and informative in the wetland settlements.
In recent years a street-village in the middle of the bog with houses of different sizes was found near Bad-Buchau at Lake Federsee (fig. 23 – Maier et al. 2016, p. 97). The mapping of the finds revealed richer and poorer inventories. Those that were more likely to be associated with the average population and others that were more likely to be associated with richer people in the village. This was expressed through special elements and commodities. This is where interpretations of social history emerge. But what was the use of the individual houses? The examination of the botanical and zoological remains up to the remains of beetles and insect larvae allowed the identification of zones of storage, of dung heaps, of the storage of cattle feed, firewood or building material. Stables and houses could be separated. This information allows us to gradually draw a more vivid picture of the Stone Age than it was possible years ago.

The reconstructions of villages and houses help science (fig. 24). In the Pile Dwelling Museum of Unteruhldingen the tradition of the early excavations was restarted in the 1990’s with new reconstructions (Schöbel 2013, p. 859). Several houses of the type Hornstaad were built, each step of the construction was documented. It was also important to subject the houses to a series of tests by living in them in order to develop a broader data basis on the influences of the use of houses on the archaeological findings (fig. 25 – Schöbel 2010, p. 93–98). Educational films were made for...
school lessons (TV-broadcasting “Sendung mit der Maus”, TV-series “Steinzeit – Das Experiment”). Damages caused by wind, flooding or even the complete destruction of the house by a storm in 2009 were very informative for the archaeological interpretations (fig. 26–29). It became clear what, for example, inclined support piles, as proven in the archaeological findings, were necessary for. We also had to use such additional piles for our experimental house after 7 years, because there were problems with the building ground which could have caused the tipping over of the whole house (Dieckmann et al. 2006, p. 119; Schöbel 2010, p. 94). The destruction of the Hornstaad house by the 2009 storm subsequently showed us exciting aspects of living on a lake. The mechanics of a lake, storms, washed up wood are enormous in the event of a disaster. Wooden house parts were washed away within shortest time by water currents and in barriers such as piles of other houses or trees they accumulated (fig. 29). 2 years after we found construction elements up to 2 km away. The ruins of the house and the fallen displaced woods could be recorded by 3 D-scans. It showed that...
The earliest prehistoric lakeside settlements of southern Germany and the reconstruction activities in the Pfahlbaumuseum Unteruhldingen (DE)

with water influence the ruin changes a lot within short time. It is exciting to see what will be left of the former house after 10 or 100 years. This experiment can then be further tested by subsequent generations of archaeologists (Schöbel 2010, p. 98). In 2010 we built the same house again a few meters more towards the lake. This house too will be controlled and documented consecutively to see how long it will last this time.

Excavations provide archaeological information and their analysis enables interpretations. But only the archaeological experiment is able to verify our interpretations and make them probable – or not. This is part of the scientific process and makes our statements more certain. This is why we launched a film project with German TV stations a few years ago entitled “Stone Age – The Experiment – Life Like 5000 Years Ago”. The setting was based on archaeological plans of the excavations from Hornstaad on Lake Constance. We wanted to know how such a social community functions, how it organises itself and what traces it would leave in the ground after three months. We searched for a lake in the hinterland of Lake Constance, built three houses with our craftsmen, produced hundreds of utensils after the original finds and sent 13 people to the Neolithic Age for 10 weeks (fig. 30, 31 – Schöbel 2008). In the beginning it was still funny.

Then it rained for 4 weeks and the participants were desperate. One catastrophe followed the other. People from today are not made for the Stone Age. There were wounds. An oven that was used as a heating system lit almost one of the houses (fig. 32). The grain preparation did not function optimally and the children got stomach aches and starved. The experiment was almost terminated by the test persons themselves. But then the sun shone again and the courage to live came back.

As archaeologists, we were particularly interested in the traces of use on ceramics and various tools made of wood, bone, stone, flint or textiles (fig. 33).
We observed how the groups organized their sleeping places or their storage. This was of great importance because we always imagined how this could still be proven in the soil after 5000 years. But we also learned that only a few percent of history can be preserved in soil. Two years after leaving the settlement site and dismantling the film set, grain plants continued to grow where they had been stored before (fig. 34). The rest had long since been overgrown by the vegetation. This project was reported intensively in the media and served for exhibitions in museums (fig. 35). Who could report more authentically from the Stone Age than those who had really been there – even if it was just for a little while? One year later this successful TV-project was adapted to the Swiss situation and relaunched there.

After this excursion back again to the earliest Pile Dwellings in southwest Germany and Switzerland. We remember that this new form of settlement came to Central Europe in the 5th millennium BC and that in some regions it supplemented the already existing form of settlements on mineral soils. It occurs in phases of an increasing occupation of the land and sometimes bears the traits of colonisation. In these phases the climate was mostly temperate to warm. Of course, there are exceptions. We are talking about a period of over 3500 years from the Neolithic to the Early Iron Age. The very strong south and east contacts and an orientation at the large waterways, rivers and traffic axes is evident. In order to understand the European connections, it will be necessary to consider not only Central Europe and the Balkans, but above all the Mediterranean region. Only in this way will it be possible in the future to satisfactorily answer questions about the origin of this form of settlement and possible influences on these developments from other regions.

In particular, the very old lakeshore settlements in the western Aegean and the Balkans will provide important clues. For this we need good data series (dendrochronological data, radiocarbon data), extensive scientific investigations and strategic research on new issues. In addition to the finds, we are interested in all information on the economic system, the environment and social structures. Here in Northwest Greece, excellent conditions have been created in recent years to answer these questions.

The investigations must also be intensified in Central Europe. Certainly, earlier settlements than before can be found in river plains, bog, moors and wetlands. And the history of neolithization and the spread of Pile Dwellings can then be rewritten.

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Bibliography

Chrysostomou, P., Jagoulis, T., Mäder, A. (2015) - The “culture of four lakes”. Prehistoric lakeside settlements of southern Germany and the reconstruction activities in the Pfahlbaumuseum Unteruhldingen (DE)


Fig. 35: Archive PM/Mende.

Fig. 34: Archive PM/MAIER.

Fig. 33: Archive PM/MEYER.

Fig. 32: Archive PM/MEYER.

Fig. 31: Archive PM/MEYER.

Fig. 30: Schöbel 2008, p. 128, fig. 25, archive PM/MAIER.

Fig. 29: Schöbel 2008, p. 128, fig. 25, archive PM/MAIER.

Fig. 28: Dieckmann et al. 2006, p. 159, fig. 73.

Fig. 27: Reinerth 1936, p. 214.

Fig. 26: Schöbel 2010, p. 93.

Fig. 25: Schöbel 2010, p. 94.

Fig. 24: Schöbel 2010, p. 98.

Fig. 23: Schöbel 2008, p. 118, fig. 10, archive PM/SWR.

Fig. 22: Schöbel 2008, p. 118, fig. 10, archive PM/SWR.

Fig. 21: Mainberger et al. 2015, p. 100.

Fig. 20: Dieckmann et al. 2006, p. 15, fig. 3.

Fig. 19: Dieckmann et al. 2006, p. 15, fig. 3.

Fig. 18: Dieckmann et al. 2006, p. 21, fig. 5.

Fig. 17: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 16: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 15: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 14: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 13: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 12: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 11: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 10: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 9: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 8: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 7: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 6: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 5: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 4: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 3: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 2: Dieckmann et al. 2006, p. 32, fig. 13.

Fig. 1: After Mainberger et al. 2015, p. 100.