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The Mesolithic in southwest Germany

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SUMMARY - *The Mesolithic in southwest Germany* - The different geographical subregions of southwest Germany yield characteristic lithic raw material which were used during the Mesolithic. The supply with raw material was dominated by Jurassic chert. Triangular microliths as well as triangular points are typical for the Early Mesolithic, while rectangular microliths and rectangular points are more common during the Late Mesolithic. Also typical for the Late Mesolithic is a new technique producing very regular blades as well as broad harpoons made of red deer antler. The diversity of mammal species in Mesolithic sites in southwest Germany is remarkable. The most common animals were red deer, roe deer and wild boar. Most Mesolithic sites in southwest Germany were settled during the warm period, between May and October. Investigations in the sites allow the differentiation of special purpose camp sites on one hand and camps with more residential attributes on the other hand.

RIASSUNTO - *Il Mesolitico nella Germania sud orientale* - Le differenti sottoregioni geografiche della Germania sud orientale forniscono il caratteristico materiale litico grezzo che era usato durante il Mesolitico. Il materiale grezzo che veniva utilizzato era rappresentato soprattutto dalla pietra silicea del Giurassico. Microliti triangolare così come punte triangolari sono tipiche del Mesolitico iniziale, mentre i microliti rettangolari e le punte rettangolari sono più comuni durante il tardo Mesolitico. Tipica del tardo Mesolitico è anche una nuova tecnica per la produzione di lame molto regolari e di larghi arpioni in corna di cervo. La diversità delle specie di mammiferi nei siti del Mesolitico nella Germania sud orientale è considerevole. Gli animali più comuni erano il cervo, il capriolo e il cinghiale. La maggior parte dei siti mesolitici della Germania sud orientale venivano occupati durante il periodo caldo, tra maggio e ottobre. Le ricerche permettono di distinguere da un lato i siti con particolari funzioni e dall'altro lato gli accampamenti con caratteristiche più residenziali.

Key words: Mesolithic, Holocene, typology, technology, camp sites

Parole chiave: Mesolitico, Olocene, tipologia, tecnologia, siti

1. HISTORY OF RESEARCH

Research in Mesolithic sites of southwest Germany started at the beginning of the last century. The famous skull burials of Ofnet Cave (Schmidt 1913) were excavated in 1908. During the Twenties and Thirties intensive research was conducted in cave and rockshelter sites (Peters 1934) as well as open air sites (Reinerth 1930) in order to establish the chronological position of the Mesolithic. The typological and chronological division of the Mesolithic was the aim of Wolfgang Taute, starting in the sixties and continuing in the seventies (Taute 1973/74). In the seventies and eighties new questions concerning both land use and exploitation of resources during the Mesolithic arose (Jochim 1976, 1998). Finally in the Nineties investigations of technological aspects during of the production of flint artefacts as well as the use of raw material were a main topic of Mesolithic research (Pasda 1994; Hahn 1998; Kind 2003).

2. GEOGRAPHY OF SOUTHWEST GERMANY

The southern part of Baden-Württemberg (Fig. 1) is bounded by the valley of the River Rhine in the west and

the south, and by Lake Constance and the Alpine mountains in the south. It can be divided into several sub-regions. Most of them are due to geological conditions and differ in their substrate, climate, vegetation and modern land use.

The most important regions for investigations concerning Mesolithic activities are the following.

Upper Rhine Valley: Trench (rift) valley created by plate-tectonics. This valley is filled with up to several hundred meters of sand and gravels, and finally covered by flood plain deposits and loess soils.

Black forest: Mountains with Mesozoic sandstones and Palaeozoic granites. The Black forest is characterized by steep incised valley and medium elevations up to 1,500 m above sea level.

Cuesta Region: Steps of different geological ages, caused by tectonic uplifts and different rates of erosion due to differing resistance of the strata. The steps contain Triassic and Jurassic sediments, mainly limestones, sandstones, mudstones and marlstones and form a hilly landscape. The surface is mainly covered by periglacial sediments such as loess and solifluction sheets which reworked the underlying sediments. The valley of the River Neckar is incised in the cuesta landscape.

Swabian Jura: Last step of the cuesta landscape with Upper Jurassic sediments, mainly limestones and marl-

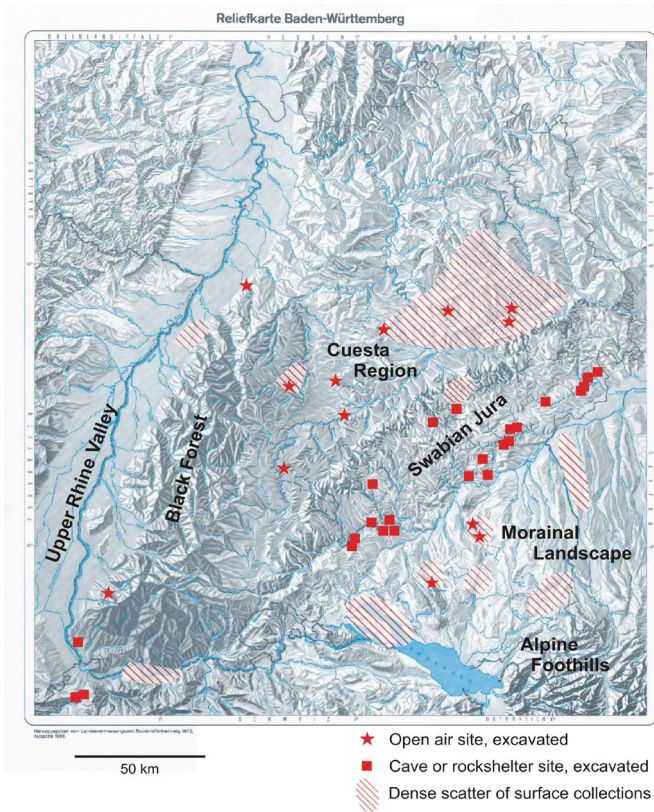


Fig. 1 - Map of Southwest Germany with Mesolithic sites.
 Fig. 1 - Mappa della Germania sud orientale con i siti mesolitici.

stones. The sediments form a high plateau with altitudes between 600 and 1000 m above sea level. Although the plateau itself seems rather flat, it slopes imperceptibly to the south at an angle of about 2°. So the northern rim is much higher, forming an escarpment which is up to 300 meters high. The surface is heavily influenced by karst phenomena and mostly covered by residual clay, slope debris, and rocky outcrops. The karst activity opened a lot of cave systems. The southern border of the Swabian Jura is marked by the River Danube.

Morainial landscape: During the Tertiary the region was originally a basin caused by the tectonic uplift of the Alpine mountains. It was subsequently filled by mollasse deposits. During the Pleistocene, the alpine glaciers pushed moraines to the north. Glacial sediments such as tills, fluvio-glacial outwash and glacio-lacustrine deposits form a hilly landscape with a lot of lakes and bogs. The largest of these lakes is Lake Constance.

Alpine Foothills: High elevations up to 2000 m above sea level caused by tectonic uplift during the Tertiary.

Mesolithic sites in southwest Germany are numerous. More than 750 places with Mesolithic artefacts are known in Baden-Württemberg, about 35 of them are excavated. Although several cave and rockshelter sites like Jägerhaus Cave (Taute 1973/74), Burghöhle Dietfurt (Gietz 2001) or Felsställe (Kind 1987) are known, most of them are open air sites, where finds can be collected from the surface. They are not randomly distributed, but in distinct clusters, such as in the area east of Stuttgart with more than 200 find spots or the Federsee region with more than 100 sites.

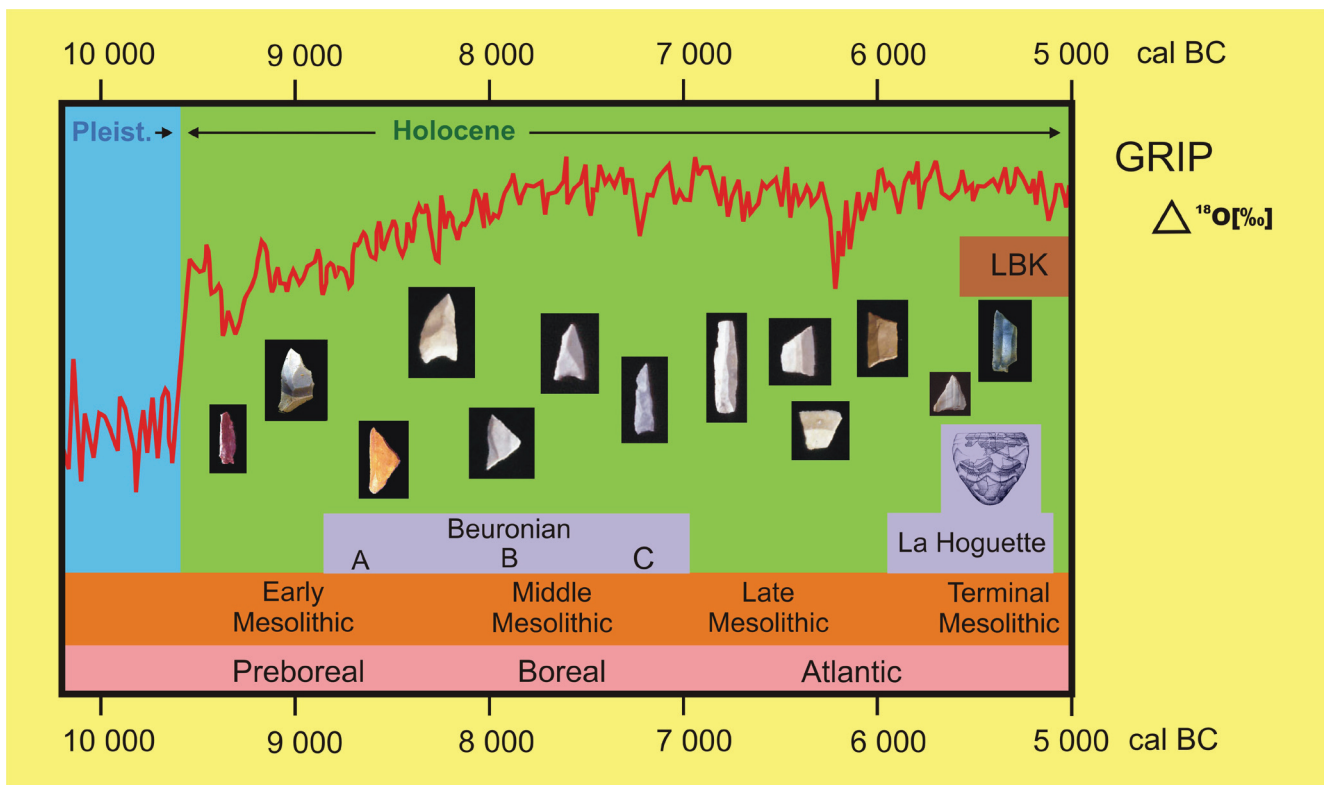


Fig. 2 - Typology and chronology of the Mesolithic in Southwest Germany.
 Fig. 2 - Tipologia e cronologia del Mesolitico nella Germania sud orientale.

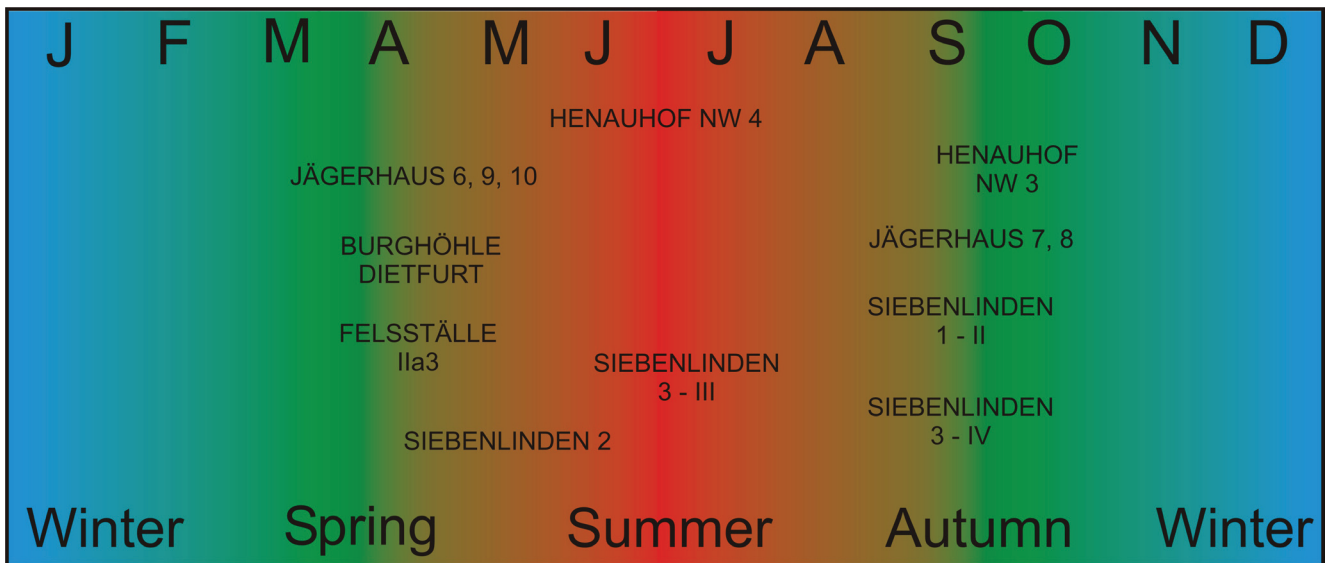


Fig. 3 - Seasonal dating of some Mesolithic sites in Southwest Germany.
 Fig. 3 - Datazione stagionale di alcuni siti mesolitici nella Germania sud orientale.

Most of these open air sites are very difficult to interpret. Nearly all of them are represented by collections from the surface. Investigations in these sites are rendered more difficult because most of the surface collections are mixed. There is nearly no inventory which belongs exclusively to the Mesolithic period. In most of them a distinct amount of artefacts can be dated to the Azilian, some to the Neolithic. At some places artefacts were found which even seem to belong to the Magdalenian.

Excavations in open air sites are rare, because in most of them are lacking any sedimentation during the last millennia. But in the few known open air sites with well preserved archaeological layers like Henauhof (Jochim 1993; Kind 1997) or Siebenlinden (Kind 2003) extended excavations yield extraordinary important finds and features.

3. DIFFERENTIATION OF THE MESOLITHIC IN SOUTHWEST GERMANY

The credit for the typological differentiation (Fig. 2) of the southwest German Mesolithic goes to Wolfgang Taute. In the early Seventies (Taute 1973/74), he divided the Mesolithic into the Beuronian, as the early phase, and the Late Mesolithic, as the final stage. The differentiation of the Mesolithic was based purely on typological considerations.

Beuronian A and B are characterized by larger triangles with differing angles and by triangular points with dorso-ventrally retouched bases. Beuronian C is characterized mainly by extremely scalene triangles. Additionally, there are straight bone points. Finally, Late Mesolithic is characterized by rectangular microliths such as trapezes as well as a new technique producing very regular blades. Also typical for the late Mesolithic are broad harpoons made of red deer antler.

During the last decades it became obvious that the

division of the Beuronian cannot be based on typological reasons only. In most sites the number of “marker fossils” is limited and their chronological relevance may be disputed (Albrecht 1984; Kind 1987; Kieselbach *et al.* 2000; Kind 2003). Surely there is a shift from larger isosceles to smaller scalene triangular microliths during the early and middle Mesolithic in southwest Germany. But it is not possible to identify clear chronological boundaries. The differences are manifested in proportional tendencies, not in strict type-fossils.

The only well established change can be observed between the Beuronian and the “Late Mesolithic”. The change from triangular to rectangular microliths seems to be abrupt. But this change mainly may have been caused by a different technology and is a supra-regional phenomenon. During the “Beuronian” (Hahn 1998: 253) nodules often were treated in fire before knapping in order to optimize the fracture qualities of the chert. The production of artefacts usually starts with the decortification at least of a part of the nodules. Cores were prepared by constructing a striking platform, mostly with a single blow. Natural or artificial crests have been used as a guide for the first blanks. The knapping of blanks was done using a soft hammer. The number of produced blades seems to be limited; a lot of blanks were quite irregular flakes. Platforms and cores were often rejuvenated and maintained. Finally mostly small cores with a size of less than two centimetres were discarded after a final removal of very small chips.

During the Late Mesolithic tempering of the nodules plays no role any more. Cortical pieces were only sometimes removed from the nodules. Again, striking platforms were mostly formed by a single blow. But then, the platforms were prepared by an intensive reduction. The separation of the blanks was done using either the punch technique, or more probably, using a pressure technique. If necessary, natural crest were used again as a guide for

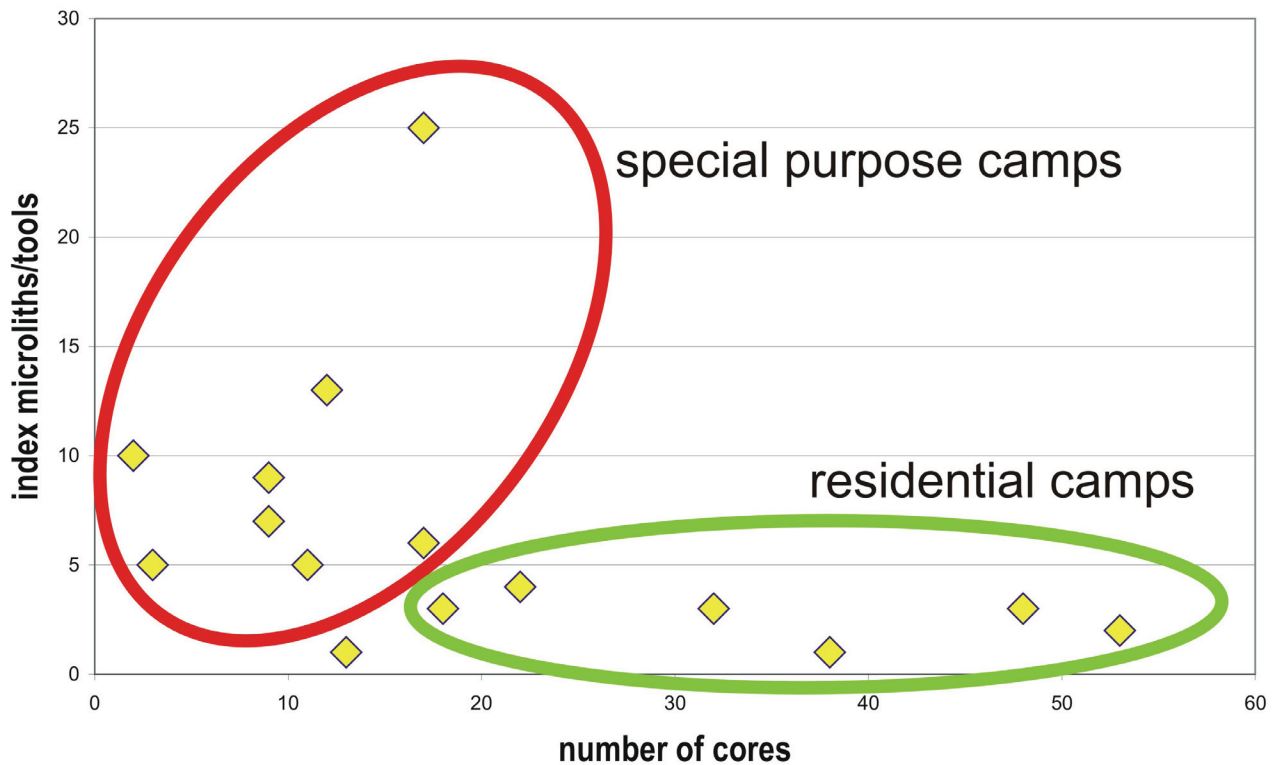


Fig. 4 - Differentiation of Mesolithic camp sites in Southwest Germany.

Fig. 4 - *Differenziazione dei siti mesolitici con accampamenti nella Germania sud orientale.*

the first blanks. Mostly blades with very regular edges and crests were produced. In most cases, flakes were produced while maintaining the striking platform. Even the smallest cores show mainly negatives of blades.

A revised differentiation of the Mesolithic of southwest Germany should reflect the problems of a strictly typological division. A distinction should be made between the early, middle, and late part of the Mesolithic, which is limited purely to the chronological borders of environmental developments and is independent from lithic microliths. Inventories dated into the Preboreal period should belong to the Early Mesolithic, those dated to the Boreal period to the Middle Mesolithic with an early and a later phase. The later phase of the Middle Mesolithic is characterized by a distinct microlithization of the artefacts. Early as well as Middle Mesolithic assemblages are characterized by triangular microliths. Late and terminal Mesolithic should be dated to the Atlantic period and are characterized by trapezes. The terminal Mesolithic has additional archaeological implications because it should be contemporaneous with the earliest Neolithic in southwest Germany, the Linear Pottery Culture.

4. LITHIC RAW MATERIAL USED DURING THE MESOLITHIC IN SOUTHWEST GERMANY

The mentioned subregions yield characteristic raw

materials which were used during the Mesolithic (a general overview may be found in Deecke 1933). White and grey upper Jurassic chert comes from the highlands of the Swabian Jura. Red and green radiolarite as well as a fine grained black quartzite is found in the fluvioglacial gravels of the morainic region. Grey and black middle Triassic chert is found in the southern part of the Cuesta region. Finally, grey, white and brown upper Triassic chert occurs mainly in the northern part of the cuesta landscape.

The raw materials of several Mesolithic sites from the different geographical subregions in southwest Germany were analysed (Tab. 1). As a first result it must be mentioned that, in contrast to other regions in Europe, in southwest Germany there is no indication for a large distance transport of lithics. All raw materials derived from sources between 100 m and 30 to 50 km from the different sites. Even the larger distances were inside the supposed range of a residential move.

All sites in the highlands of the Swabian Jura yield high amounts of up to 100% of Jurassic chert. In this region this raw material is the local one. High proportions of local chert fit into the common model concerning the supply with raw material. Also the sites of all the other subregions show relatively remarkable amounts of local materials. Upper Triassic chert is quite common in the northern part of the cuesta region, Middle Triassic chert in the southern part of the cuesta region, and radiolarite and quartzite in the morainic region. But in all this subregions the then non-local Jurassic chert is represented with high

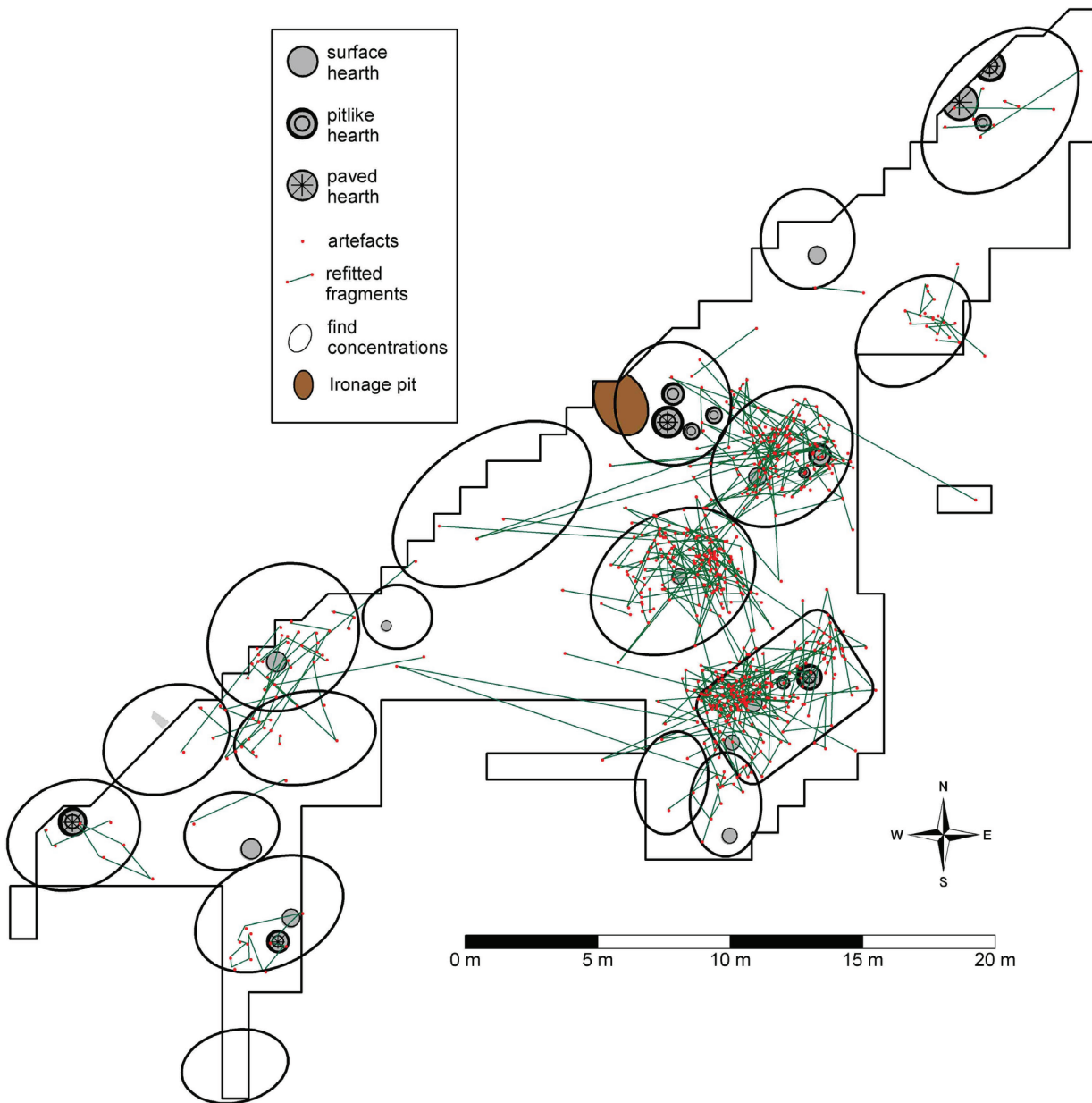


Fig. 5 - Siebenlinden 3-5, layer III, Late Boreal: refittings of lithic artefacts.

Fig. 5 - Siebenlinden 3-5, strato III, tardo Boreale: rimontaggi dei manufatti litici.

proportions of up to 70%.

In each subregion local raw material is represented, but the supply with raw material seems to be dominated by Jurassic chert. That means that there must be other factors than the pure distance from the source to explain the quantities of raw material in the Mesolithic sites of southwest Germany. The simplified assumption that the frequency of a raw material in an assemblage is related to the distance of the site to the source of the raw material does not apply to Jurassic chert in the Mesolithic of southwest Germany. It seems that per time unit in each subregion a constant number of nodules made of foreign Jurassic chert was used. Only if there was need, artefacts made of local raw materials were added.

5. ANIMAL AND PLANT RESOURCES USED DURING THE MESOLITHIC IN SOUTHWEST GERMANY

In several excavated sites the preservation of bones is good enough to give information about the economic system during the Mesolithic (e.g. Boessneck 1978; von Koenigswald 1984; Kind 2003). The diversity of species is remarkable (Tab. 2). Especially beaver and aurochs played an important role. But the most common animals were the “Big Three” of the Mesolithic hunting: red deer, roe deer and wild boar. There are assemblages with a dominance of red deer, while in other roe deer or wild boar are very frequent. Based on these faunal distributions, it is clear that

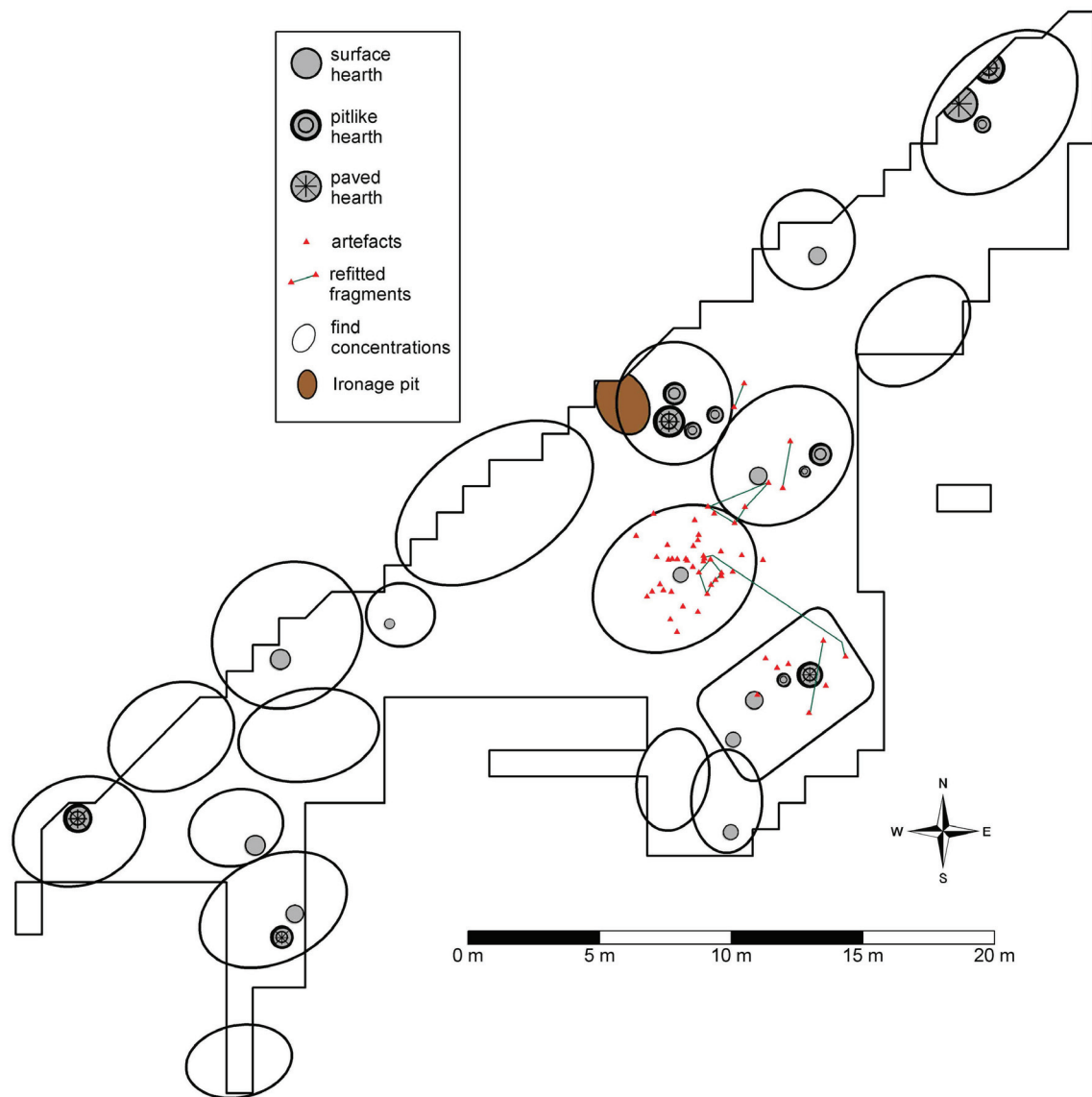


Fig. 6 - Siebenlinden 3-5, layer III, Late Boreal: distributions of artefacts assigned to Nodule MK75. Example for the contemporaneity of several find concentrations.

Fig. 6 - Siebenlinden 3-5, strato III, tardo Boreale: distribuzioni di manufatti attribuiti al Nodulo MK75.

during the Mesolithic in southwest Germany there was no economy with a preference for particular species. Although situated in the same region with similar ecological conditions each site has its own priorities. A very opportunistic pattern of subsistence seems the result of this analysis.

In some of the sites plant remains were recovered. Burnt hazelnut shells are very common. In some layers of Jägerhaus Cave, pollen of *rumex* and *allium* are extraordinary frequent. This high amount of pollen is interpreted as an indicator for the use of sorrel and wild garlic as vegetables. In the Mesolithic sites of Siebenlinden (Kind 2003), remains of fruits and seeds were found. Carbonized seeds of common orache (*Altriplex patula*), field cabbage or field mustard (*Brassica campestris*), common lambsquarters (*Chenopodium alba*), knotweed (*Polygonum aviculare*), raspberries (*Rubus idaeus*) und wild apple (*Maloidaea*) were identified.

These species demonstrate the intensive and variable use of plants for subsistence during the Mesolithic.

6. SEASONAL DISTRIBUTION OF MESOLITHIC SITES IN SOUTHWEST GERMANY

In some sites items were found which may give some information about the season the sites were settled (Fig. 3). Seeds of plants as well as eggs of birds may be used as an indicator for an occupation during spring time. Shells of hazelnuts are indicators for a late summer/early fall settlement, while unshed antler of roe deer may indicate generally a warm period occupation. Also the growth of teeth may allow a seasonal interpretation. But all these indicators usually are problematic. Because the different

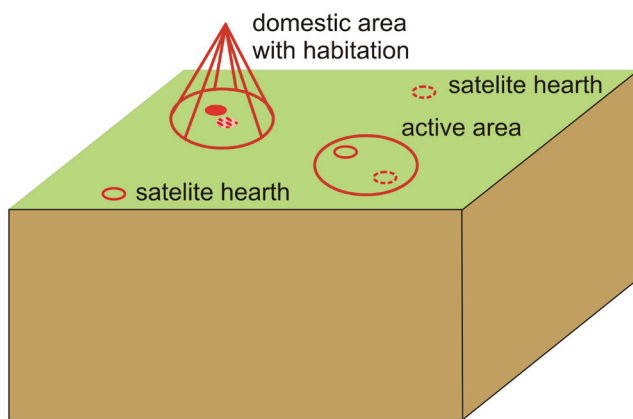


Fig. 7 - Model of a Mesolithic living unit in Siebenlinden.

Fig. 7 - Modello di un'unità insediativa mesolitica a Siebenlinden.

resources were possibly stored, they only can give information about the period of hunting and/or gathering, and not about the period of settlement and consuming.

Despite this uncertainty, it can be shown that all investigated Mesolithic sites in southwest Germany were settled during the warm period between May and October. Sites of late fall/winter/early spring occupations are missing completely.

7. DIFFERENT KIND OF CAMPSITES DURING THE MESOLITHIC IN SOUTHWEST GERMANY

Analysis of lithic implements in several assemblages allows the identification of different types of camp sites. A diagram (Fig. 4) shows the number of cores as an indicator for the intensity of artefact production. On the vertical axis an index combines the amount of microliths and microburins (as indicators for the former existence of microliths) versus the amount of larger tools. The scatter of assemblages can be divided in two groups. Assemblages of the left group have many more microliths than larger tools and only rather few cores. These sites should represent short time special purpose camp sites. A very good example for this group is layer 8 of Jägerhaus Cave with 96 microliths/microburins and only two endscrapers (Taute 1971). Assemblages of the second, lower group have less microliths in relation to larger tools and a relatively high amount of cores. These sites should represent camp sites with more residential attributes. A good example is layer IIa3 of Felsställe rockshelter (Kind 1987). Beside of 68 microliths and microburins 38 larger tools like burins, endscrapers, and truncations were found.

8. THE MESOLITHIC SITES OF SIEBENLINDEN

During the last decade several campaigns of excavation were conducted at Mesolithic open-air sites at Siebenlinden on the outskirts of the town of Rottenburg on the banks of the Neckar River. So far more than 550 m² were

excavated to reveal a stratigraphy with up to three Mesolithic layers. The sites give further information concerning the differentiation of Mesolithic camp sites.

Concentration 3 from layer IV of Siebenlinden, dated to the Middle Mesolithic between 7,800 and 8,000 years cal BC, shows the typical distribution of artefacts, bones and burnt stone fragments in a drop zone near a fireplace. The scatter of finds fits perfectly in the outside hearth model of Lewis Binford (Binford 1983). Southeast of the hearth a small roasting pit was discovered filled with a great amount of burnt hazelnut shells. This occupation took place during late summer or early fall and was quite short with the main activity of rehafting and retooling as well as preparing nuts for storage after collecting them in the pastures of the river. This site surely belongs to a kind of short time field camp.

Layer III of Siebenlinden, dated into the Late Boreal between 7,400 and 7,200 years cal BC, has a different character. It shows several concentrations of chert artefacts, bones and burnt stone fragments. Most of the 21 hearths were found inside of these concentrations. The concentrations of finds sometimes show a barrier effect which makes it possible that they reflect former walls of tents or huts. Some of them are circular, one is rectangular. This layer surely belongs to more intensive residential occupations. This can be shown by several further indications.

A good indication for a more intensive, residential occupation is the construction of hearths. For each of some paved hearths between 20 and 50 kg of river pebbles were collected and transported to the camp. Together, more than 550 kg of burnt stones were found in the Late Boreal layers of Siebenlinden.

Several implements in addition to the common lithic artefacts have of a more domestic character. Examples of these domestic artefacts are large hammer stones, stone slabs used for cooking or roasting or as grinding stones as well as several bone and antler implements like chisels or axes.

Refittings of lithics give information about activities. Also questions concerning the intensity of the archaeological palimpsest may be answered. About 15% of the lithic artefacts were refitted. Based on the refittings of the artefacts it was possible to reconstruct the worked nodules and to get detailed information about the input and the output of items. Also about 10% of the stone fragments were refitted. The stones burst in the hearths and were distributed across the surface.

Most of the refitted fragments were found in identical find concentrations (Fig. 5). But sometimes conjoining fragments of burnt stones or lithic artefacts were found in different concentrations. Those refits link different parts of the excavated area. It seems that pairs of find concentrations may belong to contemporaneous settlement units.

A slightly different approach tries to identify artefacts from individual nodules based on morphological attributes like colour, cortex, texture and embedded fossils, without refittings. Nearly 95% of the 4,900 artefacts from layer III in Siebenlinden were assigned to worked nodules, together nearly 150 items. The artefacts of some of the nodules were found quite close together in one find concentration. Artefacts from other nodules were clearly found in at least two find concentrations (Fig. 6). Although the reliability of this kind of analysis may be lower than the analysis of refitted artefacts, it can be suggested again that different concentration may belong to an identical unit of occupation.

Tab. 1 - Occurrences of lithic raw materials in Mesolithic sites of Southwest Germany. In grey: local material.
 Tab. 1 - Occorrenze di materiali litici grezzi nei siti mesolitici della Germania sud orientale. In grigio: materiale locale.

	Jurassic Chert	Middle Triassic Chert	Upper Triassic Chert	Radiolarite and quartzite
Morainal Region	20-80%	0	0	20-80%
Cuest Landsape NE	30-90%	0-1	10-70%	0
Cuest Landsape SW	40-90%	10-60%	0	0
Swabian Jura	95-100%	0-2%	0-2%	0-2%

Tab. 2 - Occurrences of mammal species in some selected Mesolithic sites of Southwest Germany. 1= Malerfels, layer 1b (Preboreal) (Koenigswald 1984); 2= Siebenlinden 1, layer II (Early Boreal) (Kind 2003); 3= Jägerhaus Cave, layer 8 (Late Boreal) (Boessneck 1978); 4= Siebenlinden 2 (Late Boreal) (Kieselbach *et al.* 2000); 5= Jägerhaus Cave, layer 7 (Early Atlantic) (Boessneck 1978); 6= Siebenlinden 3-5, layer II (Atlantic) (Stephan pers. Comm.); 7= Henauhof NW, layer 3 (Middle Atlantic) (Jochim 1993). ¹= Reindeer metapodium dated itself to 9110+/-80 BP (ETH-8265).

Tab. 2 - Occorrenze di specie di mammiferi in alcuni siti mesolitici selezionati della Germania sud orientale. 1= Malerfels, strato 1b (Preboreale) (Koenigswald 1984); 2= Siebenlinden 1, strato II (Boreale iniziale) (Kind 2003); 3= Grotta Jägerhaus, strato 8 (tardo Boreale) (Boessneck 1978); 4= Siebenlinden 2 (tardo Boreale) (Kieselbach *et al.* 2000); 5= Grotta Jägerhaus, strato 7 (Boreale iniziale) (Boessneck 1978); 6= Siebenlinden 3-5, layer II (Atlantico) (Stephan pers. Comm.); 7= Henauhof NW, strato 3 (Atlantico medio) (Jochim 1993). ¹= Metapodio di renna datato a 9110+/-80 BP (ETH-8265).

	1	2	3	4	5	6	7
Reindeer (<i>Rangifer tarandus</i>)		x ¹					
Roe deer (<i>Capreolus capreolus</i>)	x	x	x	xx	x	xx	xx
Red deer (<i>Cervus elaphus</i>)	xx	xx	x	x	xx	x	x
Wild boar (<i>Sus scrofa</i>)	x	x	xx	x	x	x	x
Aurochs (<i>Bos primigenius</i>)		x		x		x	x
Chamois (<i>Rupicapra rupicapra</i>)					x		
Moose (<i>Alces alces</i>)						x	x
Hare <i>Lepus europaeus</i>	x				x	x	
Beaver (<i>Castor fiber</i>)	x	x	x	x		x	
Wolf (<i>Canis lupus</i>)	x						
Brown bear (<i>Ursus arctos</i>)			x				
Red fox (<i>Vulpes vulpes</i>)	x	x	x	x	x	x	x
Wild cat (<i>Felis silvestris</i>)	x		x	x	x		
Badger (<i>Meles meles</i>)	x		x	x	x		x
Weasel (<i>Mustela</i> sp.)	x						
Marten (<i>Martes</i> sp.)			x	x	x		
Otter (<i>Lutra lutra</i>)			x		x		
Squirrel (<i>Sciurus vulgaris</i>)		x		x			x
Domestic dog (<i>Canis familiaris</i>)		(x)		x		x	

It is possible to identify two different kinds of find concentrations. In the first group, fragments of burnt stones are frequent, while lithic artefacts and bone fragments are rare. Most of these concentrations have a paved or pitlike hearth and sometimes show a barrier effect as an indication for former tents or huts. In the second group of find concentrations, lithic artefacts and bone fragments are frequent, while burnt stones are less important. These concentrations usually have a surface hearth. In three cases, burnt stone concentrations are linked to lithics and bone concentrations by refittings and nodule analysis and show that they are contemporaneous.

Possibly this feature gives us an idea about Mesolithic living units in Siebenlinden (Fig. 7). On one hand there was a domestic area with a paved or pitlike hearth and possibly a habitation like a tent or a hut. On the other hand there was an active area with a surface hearth where most activities like flint knapping and dismembering of game happened. And finally there were satellite hearths for special activities.

9. CONCLUSIONS

Ongoing investigations of the Mesolithic in southwest Germany have always reflected the current direction of international scientific discussion. Nowadays, typological considerations no longer are the main topic of Mesolithic research. They were replaced by inquiries concerning the differentiations of camp sites, the supply with resources, and the technology of flint knapping. It could be shown that most of the excavated cave and rockshelter sites only present part of the Mesolithic spectrum. Large open air sites with mainly residential character yield a lot of additional implements and give completely new impressions of the Mesolithic lifestyle.

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