

This celebratory volume marks the 45th year of collaboration between two great archaeologists of prehistoric Europe, Ryszard Grygiel and Peter Bogucki. It offers not only an admirable selection of papers by leading archaeologists on diverse topics pertaining to prehistory across Europe, but also a personal and social history of how Grygiel and Bogucki worked and developed intellectually in tandem, particularly through excavations at the well known Neolithic sites of Brześć Kujawski and Osłonki, Kuyavia. (...) What shines through the entire collection is the expansiveness of the honorees' joint and individual scholarship. Their work continues to provide a stimulating framework and source of research questions, addressed here through state-of-the-art techniques ranging from ancient DNA to philosophy of science.

From the review by Prof. Amy Bogaard (Oxford)

It is a kind of phenomenon that the book is dedicated to two scientists at the same time. In this case, it is fully justified. Ryszard Grygiel and Peter Bogucki were united not only by friendship but also by shared research interests. (...) From the beginning until now, the area of their activities is Kuyavia, a fertile lowland area on the left bank of the middle Vistula River. (...) The book *Walking Among Ancient Trees* is a proof of recognition from many outstanding specialists for the achievements of both jubilarians and of admiration for their cooperation, so close and undisturbed for decades. It is also an expression of gratitude for the many books and papers that have permanently entered the academic canon of our discipline.

From the review by Prof. Paweł Valde-Nowak (Kraków)

Edited by
Michał Grygiel
& Peter Obst

Walking Among Ancient Trees

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Fundacja Badań
Archeologicznych
Imienia Profesora
Konrada Jażdżewskiego

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Imienia Profesora Konrada Jażdżewskiego

WALKING AMONG ANCIENT TREES

Studies in honour of Ryszard Grygiel and Peter Bogucki
on the 45th anniversary of their
research collaboration

Edited by
Michał Grygiel & Peter Obst



Fundacja Badań Archeologicznych
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Ryszard Grygiel and Peter Bogucki
during the Annual Meeting of the European Association of Archaeologists at the Europejska restaurant,
Kraków, September 21, 2006 (Photo: Virginia Bogucki)

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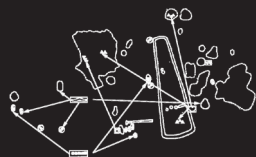
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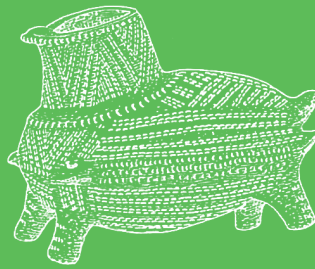
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Michael Bolus

THE LATE MIDDLE PALEOLITHIC AND THE AURIGNACIAN IN THE SWABIAN JURA (SOUTHWESTERN GERMANY)

The Swabian Jura in southwestern Germany is a key region for the study of the late Middle Paleolithic and the early Upper Paleolithic or Aurignacian in central Europe. Several cave sites have yielded considerable stratigraphic sequences with both Middle and Upper Paleolithic deposits. In 2017, six of them, Hohle Fels, Geißenklösterle and Sirgenstein in the Ach Valley, as well as Vogelherd, Hohlenstein and Bockstein in the Lone Valley have been assigned UNESCO World Cultural Heritage status. The long history of research and the abundance of deposits in many Swabian caves provide great potential for conducting detailed studies of how Neanderthals and anatomically modern humans in the region organized their subsistence and daily life some 90–35,000 years ago. Most of the Middle Paleolithic assemblages can only in general be classified as “Swabian Mousterian”, but a few can be attributed to the Keilmesser Group or Micoquian. The low find density in most Swabian Middle Paleolithic sites indicates that Neanderthals visited the region only sporadically and for short stays. The Aurignacian of the region, produced by anatomically modern humans, started fully developed more than 40,000 years ago. While it marks a clear break and a radical shift in material culture, a similar shift can be observed with regard to the occupation intensity, which increases strongly with the Aurignacian. New technologies and both lithic and organic tool types characterize these assemblages. Particularly important are various personal ornaments carved from mammoth ivory, bone and ivory flutes, and, most spectacular, ivory figurines. With ages of down to about 40,000 years, these art objects and musical instruments represent the oldest examples of their kinds known from the archaeological record and prove that the Swabian Jura was one key center of innovations in the early Upper Paleolithic.

1. Introduction

Numerous cave sites with sometimes long stratigraphies, which are situated especially in the Ach Valley and the Lone Valley, make the Swabian Jura in southwestern Germany a key region for research into the late Neanderthals of the outgoing Middle Paleolithic and the early modern humans of the Aurignacian in the beginning Upper Paleolithic (for an overview see N.J. Conard et al. 2015).

Research on the Paleolithic in the Swabian Jura has a long tradition and dates back to the 19th century. It is inextricably linked with the names Oscar Fraas, Robert Rudolf Schmidt, Eduard Peters, Gustav Riek, Robert Wetzel, Joachim Hahn, Nicholas Conard, and others (see N.J. Conard and M. Bolus 2006; M. Bolus 2015a; M. Bolus and N.J. Conard 2019). Among the sites of the Swabian Jura, the cave sites Geißenklösterle, Hohle Fels, Vogelherd and Hohlenstein-Stadel are particularly well-known for their figurative works of art and musical instruments from the Aurignacian layers (J. Hahn 1986; J. Hahn and S. Münzel 1995; N.J. Conard et al. 2004a; 2009; N.J. Conard 2009; N.J. Conard and C.-J. Kind 2017).

2. The cave sites of the Swabian Jura

The Swabian Jura is a low mountain range, which runs through the German state of Baden-Württemberg in a southwest-northeast direction and, at its northeastern end, includes a small part of the state of Bavaria. Here, the Nördlinger Ries forms the political border between the two federal states and at the same time the regional border between Swabian and Franconian Jura. From a geological and spatial point of view, the Hegaualb south of the Danube in the southwest also belongs to the Swabian Jura as do limited areas in Switzerland. The Swabian Jura ranges in elevation from about 450 to 1000 Meters. Particularly striking is the steep drop in the northwest, the so-called 'Albtrauf'. To the southeast, however, the plateau flattens down gently towards the Danube valley, respectively the 'Donauried'. Almost all Paleolithic sites of the Swabian Jura are caves, often with both late Middle

Paleolithic and Upper Paleolithic layers, the latter with deposits covering the entire Upper Paleolithic. Research in Swabia has typically focused on caves which in most cases provide excellent preservation of faunal remains while, although they are present, little is known about open-air sites (H. Floss et al. 2015; N.J. Conard and C.-J. Kind 2017; M. Bolus and N.J. Conard 2019).

The most important Swabian cave sites are situated in the Ach Valley 15 km west of Ulm and the Lone Valley 25 km north of Ulm (Fig. 1). A good number of these sites, such as Hohle Fels, Geißenklösterle and Sirgenstein in the Ach Valley and Vogelherd, Hohlenstein-Stadel and Bockstein-Törle in the Lone Valley have yielded considerable stratigraphic sequences with both Middle and Upper Paleolithic deposits. Große Grotte and Kogelstein in or next to the Ach Valley, Bocksteinschmiede and Haldenstein in the Lone Valley are well known for their Middle Paleolithic assemblages; the Middle Paleolithic rock shelter Heidenschmiede in the municipal area of Heidenheim may be added to these sites. Brillenhöhle in the Ach Valley yielded important middle and late Upper Paleolithic deposits, while Langmahdhalde in the Lone Valley produced rich Magdalenian finds and features. Other cave sites in the Lauchert Valley in the southwestern part of the Swabian Jura such as Göpfelsteinhöhle, Schafstall, Nikolaushöhle and Annakapellenhöhle are less well-known, although they yielded considerable Middle and Upper Paleolithic find layers (M. Bolus and N.J. Conard 2019) (Fig. 1).

In 2017, six of the Swabian caves, Hohle Fels, Geißenklösterle and Sirgenstein in the Ach Valley, as well as Vogelherd, Hohlenstein and Bockstein in the Lone Valley have been assigned UNESCO World Cultural Heritage status under the denomination of 'Caves and Ice Age Art in the Swabian Jura' (N.J. Conard 2017; N.J. Conard and C.-J. Kind 2017).

3. Chronology

While, in general, for the Aurignacian of the Swabian caves a solid data framework is available, dates for the Middle Paleolithic are much more seldom and they still seem to be problematic. For the Middle Paleolithic of Geißenklösterle Cave, however, the situation has increasingly improved during the last years. While the ages of Middle Paleolithic assemblages are at and beyond the limits of radiocarbon dating and should therefore be treated with caution, meanwhile a fairly good framework exists for the Geißenklösterle Middle Paleolithic through various other dating methods (including AMS) (T. Higham et al. 2012, 2014; N.J. Conard 2019; M. Richard 2019; N.J. Conard et al. 2020).

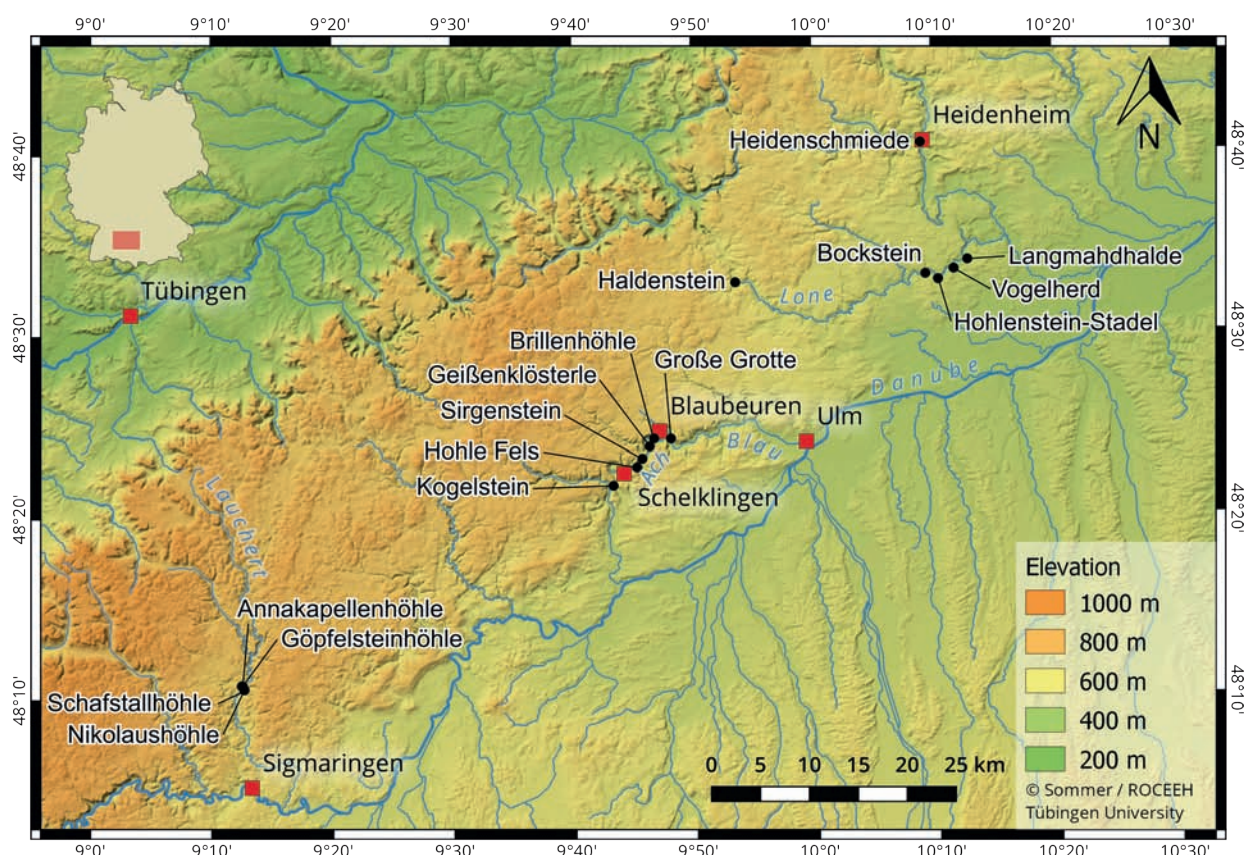
According to measurements with different methods, the total of five Middle Paleolithic layers from Geißenklösterle covers a time span from about 94 ± 10 ka and 73 ± 9 ka for the second deepest Middle Paleolithic layer AH VII to about 65 ± 8 and 55 ± 6 ka for the uppermost Middle Paleolithic layer AH IV.

Concerning the chronology of the Swabian Aurignacian, Geißenklösterle, Hohle Fels, and Hohlenstein-Stadel are the most important sites with more than 100 radiocarbon dates and the independent confirmation of the early ^{14}C dates using TL measurements on burnt flint (D. Richter et al. 2000; N.J. Conard and M. Bolus 2008; N.J. Conard 2009; T. Higham et al. 2012; C.-J. Kind 2019). Calibrated and modeled ages reach as far back as about 43,000 BP for Geißenklösterle Cave and about 42,000 BP for Hohle Fels (T. Higham et al. 2012, 2014; G. Bataille and N.J. Conard 2018). This means that, seen in a European scale, the Aurignacian appeared rather early in the Swabian Jura suggesting an early dispersal of anatomically modern humans into the region via the Danube Valley.

Beyond all radiometric dates, there can be no doubt about the cultural stratigraphic relationship of the Middle Paleolithic and Aurignacian complexes

in the Swabian Jura. Robert Rudolf Schmidt (1912) following his excavations in Sirgenstein in 1906 and Gustav Riek (1934) following his fieldwork in Vogelherd in 1931 already pointed out that archaeologically sterile deposits separated the uppermost Middle Paleolithic from the lowermost Aurignacian. This was confirmed by Joachim Hahn in Geißenklösterle and, more recently, by Nicholas Conard in Hohle Fels and, again, Geißenklösterle (J. Hahn 1988; N.J. Conard et al. 2006; M. Bolus 2015b). We have to assume that Neanderthals and early modern humans did not meet in the Swabian Jura. In this respect, Schmidt's observation continues even after about 115 years of intensive field work, carried out with modern standards in the caves of the Swabian Jura in the last decades (N.J. Conard et al. 2006).

Interestingly enough, the Swabian Gravettian, following the Aurignacian, also starts particularly early on a European scale. With calibrated ages of 35–34 ka BP, for example, the Gravettian of Hohle Fels is one of the oldest assemblages of the middle Upper Paleolithic in Central Europe (A. Taller and N.J. Conard 2019). The Gravettian deposits of Geißenklösterle yielded similar ages (T. Higham et al. 2012).



■ **Fig. 1.** Map of the main part of the Swabian Jura showing Middle and Upper Paleolithic cave sites mentioned in the text. Map provided by Christian Sommer (ROCEEH). Copyright C. Sommer/ROCEEH and University of Tübingen

4. Human remains

Human remains from the Paleolithic of the Swabian Jura are generally very rare; in addition, almost exclusively single bones or teeth were found (for a detailed taphonomic analysis see N. Sala and N. Conard 2016). This is particularly true of the Middle Paleolithic and the early Upper Paleolithic. From the Middle Paleolithic there is an isolated thigh bone fragment of a Neanderthal from Hohlenstein-Stadel in the Lone Valley as the only Neanderthal remnant in all of southwestern Germany (M. Kunter and J. Wahl 1992). For the Aurignacian, we primarily know of three isolated teeth from Sirgenstein in the Ach Valley. For one tooth respectively from Hohlenstein-Stadel and from Schafstall II in the Lauchert Valley, Aurignacian affiliation is possible, but by no means assured. The human remains from Vogelherd in the Lone Valley, which were assigned to the Aurignacian for a long time, proved to be Neolithic (N.J. Conard et al. 2004b).

5. The Middle Paleolithic of the Swabian Jura

While Middle Paleolithic open-air sites are very rare in the Swabian Jura (e.g., Börslingen: H. Floss et al. 2015; see also M. Bolus and N.J. Conard 2019), Middle Paleolithic deposits are well represented in both the Ach and the Lone Valleys as well as in the Lauchert Valley. While the oldest Middle Paleolithic finds in the Swabian Jura seem to date to the Eemian interglacial (MIS 5e), most Middle Paleolithic assemblages, date to MIS 3. Few assemblages can be assigned to the Keilmesser Group (Micoquian/Prądnikian). In the first place is layer III of Bockstein Cave and Bocksteinschmiede in the Bockstein complex, which, compared to the other Middle Paleolithic layers of the Swabian Jura, is extraordinarily rich in finds (R. Wetzel and G. Bosinski 1969; B. Çep 2014; B. Çep and P. Krönneck 2015). In addition, the Keilmesser assemblage from Heidenschmiede in Heidenheim (E. Peters 1931) is relatively rich in finds. The Keilmesser assemblages include bifacial backed knives (Keilmesser) (Fig. 2:3), handaxes (Fig. 2:2, 4) and a broad variety of side scrapers (Fig. 2:5–6).

Most Middle Paleolithic deposits in the Swabian Jura, including those from Große Grotte, Sirgenstein, Geißenklösterle, Hohle Fels, Kogelstein, Hohlenstein-Stadel, Hohlenstein-Bärenhöhle and Vogelherd (except for one very small Keilmesser assemblage) yielded non-standardized assemblages which may in general be classified as Swabian Mousterian (R.R. Schmidt 1912; G. Riek 1934;

E. Wagner 1983; D. Beck 1999; R. Böttcher et al. 2000; N.J. Conard et al. 2012; 2020). In most cases, these assemblages are not very rich and characterized by small irregular Levallois cores and a limited set of formal tools, mostly side-scrapers and, much more seldom, points (Fig. 3).

A very small assemblage from Haldenstein Cave in the Lone Valley only consists of two bifacial leaf points (*Blattspitzen*) and a large blade (Fig. 2:1) (G. Riek 1938). This assemblage belongs to the *Blattspitzengruppe*, which, although not sufficiently dated, seems to represent the latest expression of the Middle Paleolithic in Germany (G. Bosinski 1967; M. Bolus 2004), showing their southwestern limit of distribution in the state of Baden-Württemberg (M. Bolus and O. Rück 2000). Unfortunately, assemblages belonging to the *Blattspitzen* Group are extremely rare in the Swabian Jura and in general only consist of few lithic artifacts. This being said, it is doubtful whether the occurrence of few leaf points both in Sirgenstein (B. Çep 1996) and in layer II of the Große Grotte (E. Wagner 1983) justifies assigning the corresponding assemblages to the *Blattspitzen* Group. Other than colleagues in other parts of Europe, for instance eastern central Europe, the German research tradition does not view the *Blattspitzen* Group as an initial Upper Paleolithic techno-complex but instead classifies it as belonging to the latest Middle Paleolithic.

Finds made of organic materials are generally rare in the Swabian Middle Paleolithic. Apart from a few bone points, they mainly include bone retouchers (M. Bolus and N.J. Conard 2006; N.J. Conard et al. 2006; 2012; G. Toniato et al. 2018). There is no secure evidence of personal ornaments. The best evidence for anthropogenic features comes in the form of a fireplace at Sirgenstein (R.R. Schmidt 1912) and concentrations of burnt bone at sites including Große Grotte (E. Wagner 1983), Bocksteinschmiede (R. Wetzel 1958), and perhaps Hohlenstein-Stadel (see D. Beck 1999).

Horse and reindeer were the most frequently hunted animal species. Directly related to the immediate surroundings of certain sites, other species might take an important part in the diet, such as ibex at the site of Große Grotte (J. Weinstock 1999). Woolly rhino is much less frequent but reaches higher percentages than in the Swabian Aurignacian. Cave bear is abundant in all Middle Paleolithic sites but although some cave bear bones show slight traces of anthropogenic modification, there is no clear indication that Neanderthals hunted this animal (P. Krönneck et al. 2004; S.C. Münzel and N.J. Conard 2004; N.J. Conard et al. 2012; P. Krönneck 2012; K. Kitagawa 2014; S.C. Münzel 2019).

The low find density in most Middle Paleolithic caves of Swabia indicates that Neanderthals visited

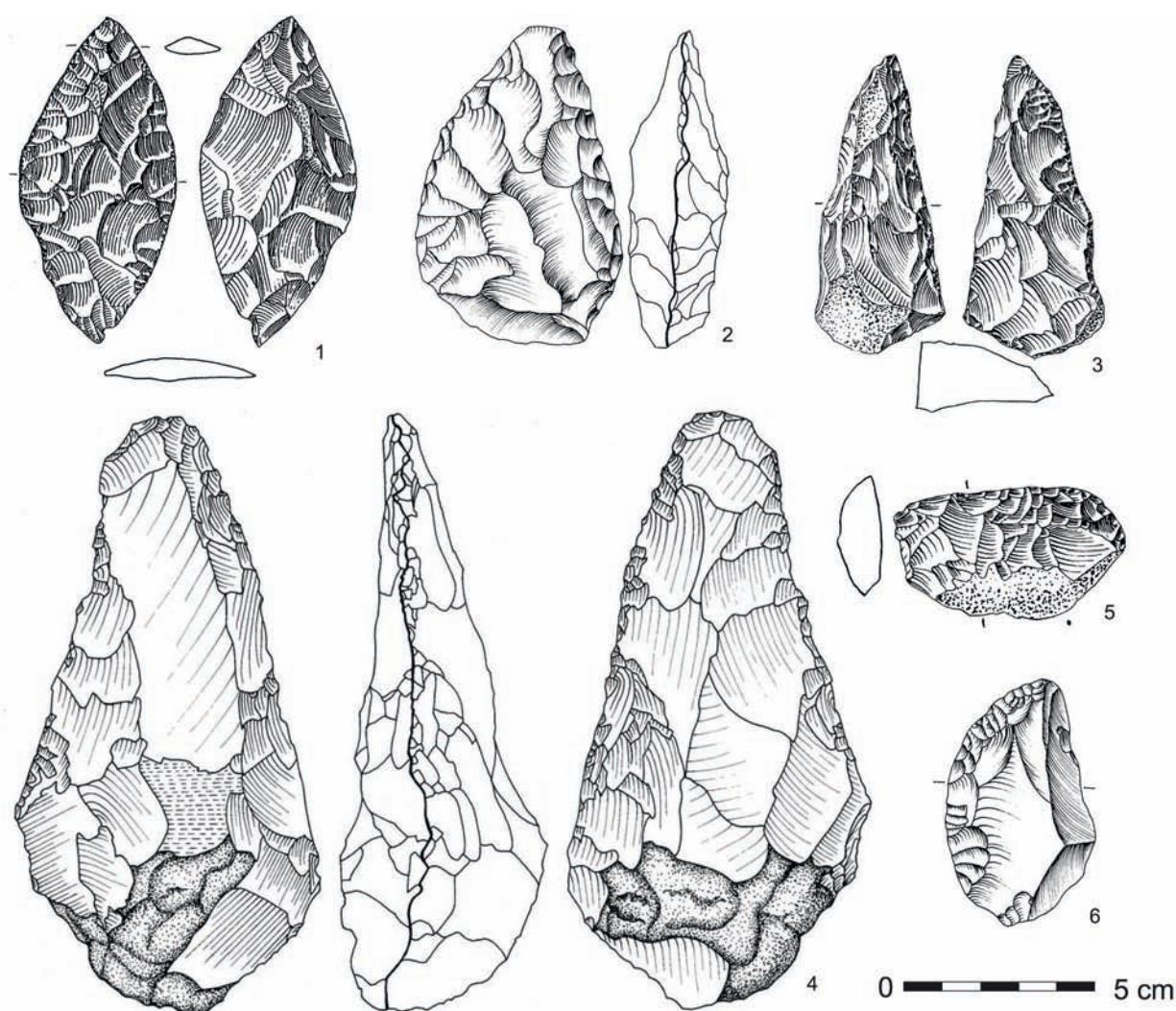
most of these localities only sporadically and for short stays. The large number of cave bear bones indicates that bears used the caves much more intensively than humans during the Middle Paleolithic (N. J. Conard et al. 2012).

6. The Aurignacian of the Swabian Jura

The Swabian Jura is particularly well-known for its Aurignacian deposits, especially those from Geißenklösterle and Hohle Fels in the Ach Valley. Aurignacian assemblages of similar importance come from Vogelherd Cave in the Lone Valley, the richest Aurignacian site all over Swabia, which,

however, suffers from the old excavations without modern standards in 1931. Moreover, Hohlenstein-Stadel in the Lone Valley and Göpfelsteinhöhle in the Lauchert Valley should be mentioned here (see M. Bolus and N.J. Conard 2019).

Starting with the lowermost Aurignacian assemblages in Geißenklösterle, Hohle Fels and Hohlenstein-Stadel some 43–40 ka ago, the material culture in Swabia changes completely. All Aurignacian sites from Swabia show a broad spectrum of new artifact types, both lithic and organic, and a remarkable variety of personal ornaments as well as figurative art and musical instruments which are totally lacking in the Middle Paleolithic assemblages of the region (N.J. Conard and M. Bolus 2006). Evidence from the lowermost Aurignacian layers of several sites demonstrates that the Swabian Aurignacian



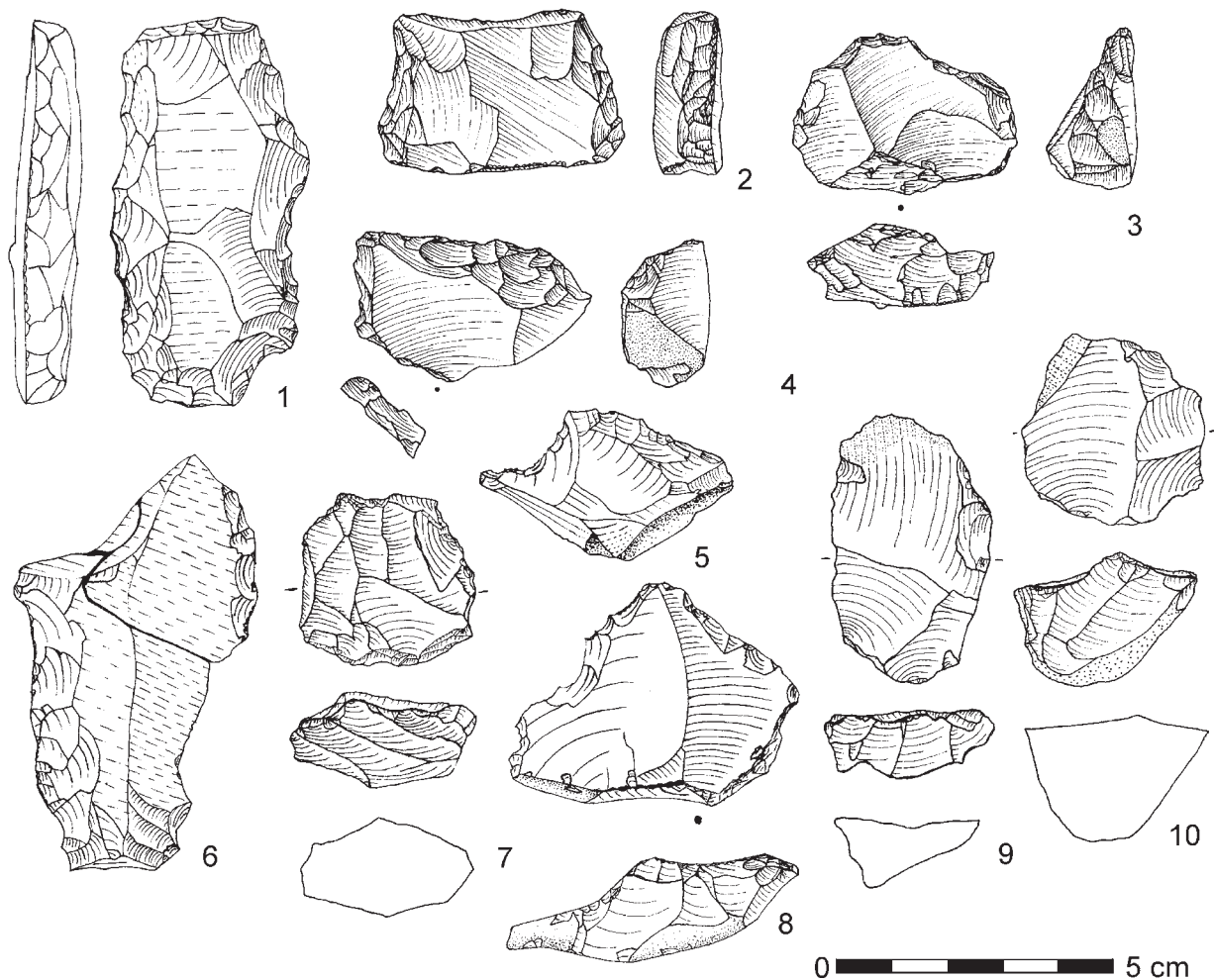
■ **Fig. 2.** Middle Paleolithic stone tools from the Swabian Jura representing the Keilmesser Group and the Blattspitzen Group. 1 Blattspitze (leaf point), 2 small handaxe (Fäustel), 3 Keilmesser (bifacial backed knife), 4 handaxe, 5–6 side scrapers. 1 Haldenstein, 2, 5–6 Heidenschmiede, 3 Bocksteinschmiede, 4 Winterhalde. After Conard et al. 2012

was fully developed from the beginning and contained the whole package of early Upper Paleolithic innovations including symbolic artifacts without showing any signs of continuity between Middle and Upper Paleolithic.

The lithic technology of the Swabian Aurignacian is predominantly based on a unidirectional blade and bladelet production. Blades, and to a much lower degree, bladelets were produced from platform cores. For the production of bladelets, carinates often served as cores; moreover, there seems to have been a production of bladelets from 'regular' burins, too (G. Bataille and N.J. Conard 2018). Retouched forms include a wide variety of tools such as carinated and nosed endscrapers (which may, as just mentioned, also be seen as bladelet cores, Fig. 4:1–4), simple endscrapers (Fig. 4:11), burins of various types (Fig. 4:8–10) including busked and carinated burins (which may have served as bladelet cores, too), Spitzklingen (pointed

blades, Fig. 4:13), splintered pieces, truncated pieces (Fig. 4:7) and blades with lateral Aurignacian retouch (Fig. 4:5–6) (N.J. Conard and M. Bolus 2006). All of these forms are completely lacking in the preceding Middle Paleolithic of the region. A single side scraper (Fig. 4:12), however, reminds of Middle Paleolithic side scrapers.

Organic tools are present with a remarkable variety of types (N.J. Conard and M. Bolus 2006; 2009). First and foremost, projectile points have to be mentioned here. While pencil-shaped ivory points are only known from the lowermost Aurignacian deposits of Geißenklösterle and Hohle Fels (M. Bolus and N.J. Conard 2006) (Fig. 5:4), split-based bone points, 'type fossil' of the early Aurignacian, are known from several sites including Bocksteinhöhle, Vogelherd and Geißenklösterle (Fig. 5:1, 5–7). At Hohle Fels split-based points with an age of down to about 40 ka BP are already present in the lowermost Aurignacian layer (N.J. Conard and

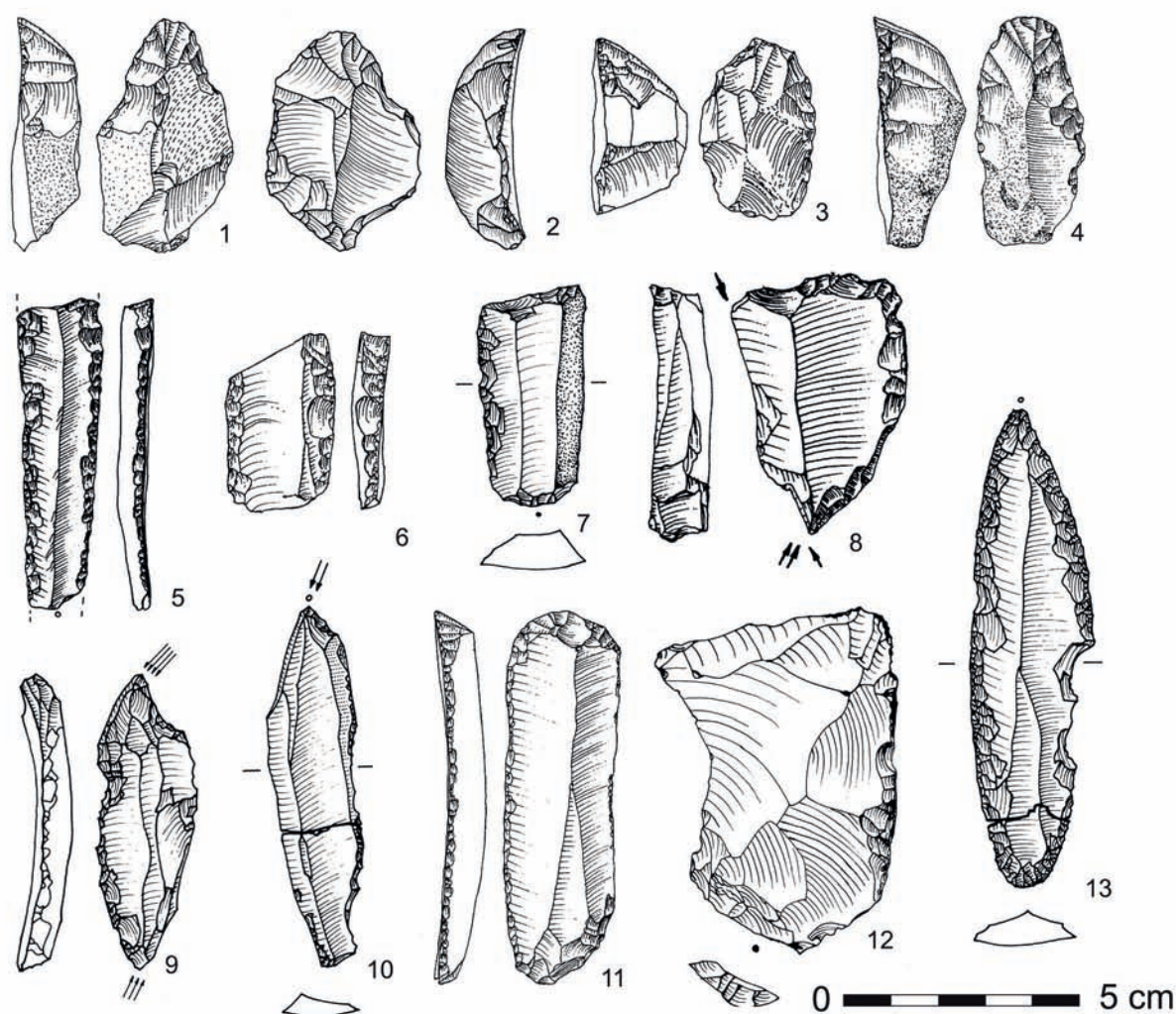


■ **Fig. 3.** Late Middle Paleolithic stone artifacts from Geißenklösterle (1–4) and Hohle Fels (5–10), representing the Swabian Mousterian. 1–2, 4–6 side scrapers, 3 retouched flake with faceted platform remnant, 7–10 Levallois cores. After Conard et al. 2012

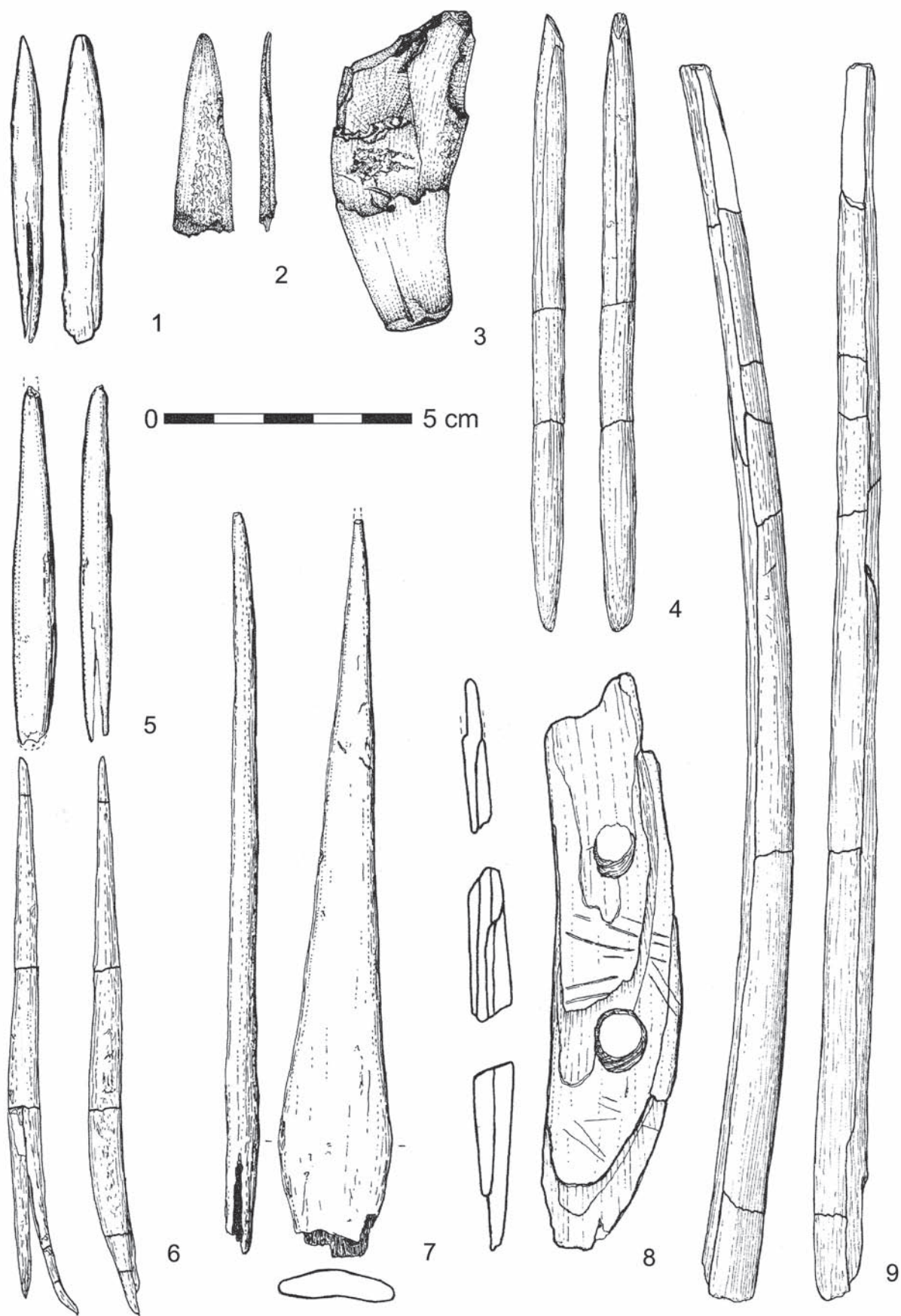
M. Malina 2009). Given the age of about 32 ka BP (uncalibrated) for one specimen from Brillenhöhle (M. Bolus and N.J. Conard 2006), split-based points appear almost throughout the whole 'lifespan' of the Swabian Aurignacian. Other types of organic tools include bone or ivory points (Fig. 5:2, 9), burishers, awls, ivory rods, perforated ivory objects of unknown function, retouchers (Fig. 5:3) and bâtons percés made of ivory (Fig. 5:8). An outstanding object from recent years is a bâton percé made of ivory that was discovered in 2015 in the lowermost Aurignacian of the Hohle Fels (N.J. Conard and M. Malina 2016). The tool has four holes that have carefully cut spiral notches. Experimental archaeological investigations in collaboration with Veerle Rots indicate that cords or ropes were made from plant fibers with this tool (N.J. Conard and V. Rots

2016). For the first time we would have tangible information about the use of such bâtons percés with spiral holes which are also known from the Aurignacian of Vogelherd and Geißenklösterle. Interestingly, all bâtons percés from the Aurignacian of the Swabian Jura are made of mammoth ivory, while in the Swabian Gravettian, with one exception, they consist of reindeer antler.

In general, the high amount of ivory objects including lots of debris from their fabrication is a striking trait of the Swabian Aurignacian (S. Wolf 2015). Personal ornaments include a wide array of perforated and grooved teeth from carnivores and herbivores (Fig. 6:1–4). Moreover, the Aurignacian sites have produced a variety of fully carved beads and pendants from mammoth ivory. Most characteristic are finely carved double perforated beads which



■ Fig. 4. Stone tools from the Aurignacian of the Swabian Jura. 1–2 nosed end scrapers, 3–4 carinated end scrapers, 5–6 laterally retouched blades, 7 double truncation, 8 double burin, 9 busked burin, 10 burin on truncation, 11 end scraper on blade, 12 side scraper-like tool, 13 pointed blade (*Spitzklinge*). Geißenklösterle (1, 3, 4, 6, 11), Hohle Fels (2, 7, 9, 10, 12, 13), Hohlenstein-Stadel (5), Vogelherd (8). After Conard and Bolus 2009



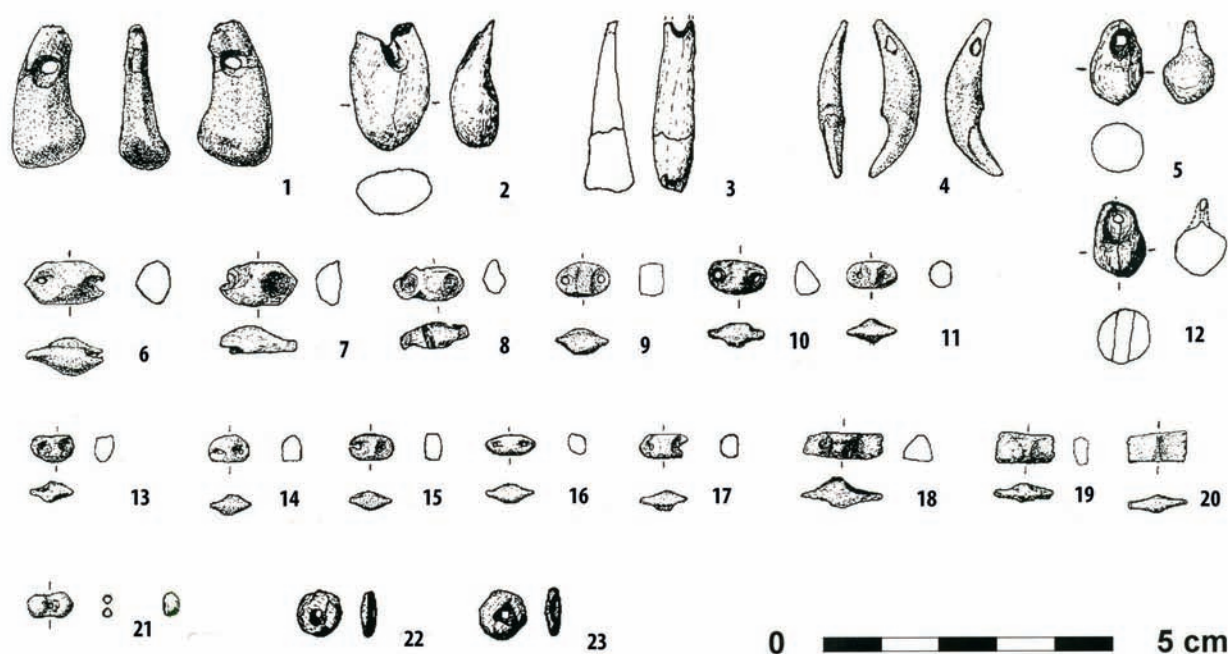
■ **Fig. 5.** Organic tools from the Aurignacian of the Swabian Jura. Vogelherd (1, 5, 8), Hohle Fels (2–3), Geißenklösterle (4, 6, 9), Bocksteinhöhle (7). 1, 5–7 projectile points with split base, 2, 4, 9 bone and ivory points, 3 retoucher made of a tooth, 8 bâton percé made of ivory. Strongly modified after Conard and Bolus 2009

have been found both in Ach and Lone Valley sites (Fig. 6:6–11, 13–17; 7:2). They are not known from Aurignacian contexts elsewhere. All stages of production of the beads can be documented at Hohle Fels, Geißenklösterle and Vogelherd (Fig. 6:18–20). Double perforated ivory beads appear throughout the whole lifespan of the Swabian Aurignacian, the oldest specimens with an age of down to about 40,000 years coming from Hohle Fels and from Geißenklösterle. Other forms include, among many others, basket shaped ivory pendants (Fig. 6:5, 12), small ivory discs (Fig. 6:22–23; 7:4–5), toggle- and violin-shaped ivory beads, and beads with a single perforation (Fig. 6:21; 7:3) (N.J. Conard 2003a; S. Wolf 2015). A singular object is a retoucher made of antler used as pendant.

One of the most outstanding traits of the Swabian Aurignacian is the presence of figurative art represented primarily by small figurines carved from mammoth ivory and of musical instruments. Until today, four caves – Hohle Fels, Geißenklösterle, Vogelherd and Hohlenstein-Stadel – have yielded about 30 fairly easily recognizable representations and numerous fragments that cannot be further interpreted and which date between about 40 and 35 ka BP (G. Riek 1934; J. Hahn 1986; N.J. Conard 2003b; 2018; N.J. Conard and C.-J. Kind 2017). In most cases, animals are depicted: mammoths (Fig. 7:1), felines, horses,

bisons and other, less frequently depicted species including a bear, a waterbird and a fish. A special group is represented by therianthropomorphic figurines which combine human with animal features. Two of them, one from Hohlenstein-Stadel with a length of about 31 cm and one from Hohle Fels with a length of less than 3 cm, are referred to as Löwenmenschen (Lion men), since they show a combination of characteristics of lions and humans (N.J. Conard 2003b; C.-J. Kind et al. 2014; N.J. Conard and C.-J. Kind 2017). A third object, a small ivory plate from Geißenklösterle, bears the half-relief of a figure with uplifted arms which might also represent a Lion man (J. Hahn 1986).

A singular piece of art is a Venus figurine carved from mammoth ivory which was discovered in the lowermost Aurignacian of Hohle Fels (N.J. Conard 2009). The Venus is 6 cm high and lacks a head. Instead, a carefully carved ring is located off-center above the shoulders of the figurine (Fig. 7:6). Large breasts project forwards, with two short arms with carefully carved hands resting below these breasts. An oversized vulva is visible between the legs. With a radiocarbon age of about 40,000 years, this Venus is perhaps the earliest example of figurative art worldwide. Parts of a second, slightly larger Venus figurine have meanwhile been discovered in the same Aurignacian layer of Hohle Fels (N.J. Conard and M. Malina 2015).



■ Fig. 6. Hohle Fels. Range of variation of the personal ornaments from the Aurignacian. 1–4 perforated animal teeth; all other objects have been carved from mammoth ivory: 5, 12 basket-shaped pendants, 6–11, 13–17 double perforated beads, 18–20 preforms of double perforated beads, 21 bead with a single perforation, 22–23 small perforated discs. Modified after N.J. Conard 2003a



■ **Fig. 7.** Ivory objects from the Swabian Aurignacian. 1 mammoth figurine from Vogelherd, 2–5 personal ornaments from Hohle Fels, 6 Venus figurine from Hohle Fels, 7 flute from Geißenklösterle. © University of Tübingen: 1, 7 Photo: J. Lipták; 2–6 Photo: H. Jensen; compilation by M. Malina. Modified after M. Bolus 2015

Only 70 cm away from the first Venus and in the same find layer, a flute made from a vulture bone (N.J. Conard et al. 2009) was discovered. The fact that in the meantime already eight Aurignacian flutes are known from three Swabian caves – Geißenklösterle, Hohle Fels and Vogelherd – shows that a musical tradition existed in the Swabian Jura as early as 40,000 years ago. Four of the flutes are made from bird bones, the other four are made from mammoth ivory (J. Hahn and S. Münzel 1995; N.J. Conard et al. 2009) (Fig. 7:7). While it already affords some know-how to make a flute out of a bird bone which is hollow by nature, it is a demonstration of highest technical skills to carve a flute out of a massive piece of ivory (N.J. Conard et al. 2004a; M. Malina and R. Ehmann 2009). One of the most surprising observations is that it is possible with these Aurignacian flutes to play complex melodies just like with modern flutes of today, as has been demonstrated by experimental archaeologists (S. Münzel et al. 2002; A.F. Potengowski and S.C. Münzel 2015).

Other than the Middle Paleolithic layers, the Aurignacian deposits in Hohle Fels yielded a number

of anthropogenic features which are fire-related but represent dumping areas rather than real fireplaces (N.J. Conard and M. Bolus 2008). At least one fireplace was excavated in the lower Aurignacian layer in Geißenklösterle (J. Hahn 1988; 1989), while the upper Aurignacian layer yielded a large concentration of burnt bones (J. Hahn 1988). For the Aurignacian deposits of both Sirgenstein and Vogelherd, several fireplaces are documented by the excavators (R.R. Schmidt 1912; G. Riek 1934).

Subsistence in the Swabian Aurignacian was based primarily on horse and reindeer just like in the Swabian Middle Paleolithic; moreover, there is a certain percentage of mammoth (P. Krönneck et al. 2004; S.C. Münzel and N.J. Conard 2004; N.J. Conard et al. 2012; P. Krönneck 2012; K. Kitagawa 2014; S.C. Münzel 2019).

The find density in the Swabian Aurignacian is much higher than in the preceding Middle Paleolithic. This seems to indicate that the Aurignacians used the caves much more intensively than the Neanderthals (see above) (N.J. Conard et al. 2012). This is underlined by the fact that cave bear bones, though still numerous, are much less

abundant than in the Middle Paleolithic when human presence in the caves had only been sporadic.

7. Conclusions

The archaeological record of southwestern Germany shows a pronounced break between the late Middle Paleolithic and the earliest Upper Paleolithic or Aurignacian (N.J. Conard 2011; M. Bolus 2015b). Although human fossils are sparse in Swabia, the only Neanderthal bone has been found in association with Middle Paleolithic artifacts and so far modern humans are exclusively associated with Upper Paleolithic assemblages. Given the fact that in most cases the late Middle Paleolithic and the Aurignacian are separated from each other by sterile or nearly sterile layers, no Neanderthals lived in the Swabian Jura when anatomically modern humans arrived there more than 40,000 years ago. The Swabian Aurignacian appears suddenly in a highly developed form containing numerous regionally unique signatures, differing strongly from the local Middle Paleolithic.

The analysis of the find densities in Middle Paleolithic and Aurignacian deposits from Swabia demonstrates a shift in occupation intensity. Though the mere numbers of lithic artifacts, burnt bone, charcoal, and anthropogenically modified faunal remains do not automatically reflect the time and intensity of occupation, most of these data reveal a factor of 10 or even 100 times more cultural debris per unit sediment volume during the Aurignacian versus the Middle Paleolithic (N.J. Conard 2011; N.J. Conard et al. 2012, M. Bolus 2015b). Even if these figures are viewed as rough approximations, the intensity of occupation at carefully excavated and documented sites such as Hohle Fels and Geißenklösterle was far lower in the Middle Paleolithic than in the Aurignacian. This seems to reflect an increase in population densities in the Aurignacian relative to the Middle Paleolithic.

While, with the exception of sites belonging to the Keilmesser Group, most assemblages of the late Swabian Middle Paleolithic do not allow a classification other than 'Swabian Mousterian',

the Swabian Aurignacian yielded spectacular objects. It started about 43–42,000 years ago in this region, and right from the start, this techno-complex is characterized by a full package of Upper Paleolithic innovations such as new technologies, new tool-types, both lithic and organic, a variety of personal ornaments, and, perhaps most impressive, figurative art and fully developed musical instruments, both belonging to the oldest examples known worldwide. There is no other region in the whole world where the appearance of these singular early Upper Paleolithic features can be traced at that early time. "Given that many artifact forms, most notably certain personal ornaments, figurative mobile art and musical instruments are exclusively limited to the Aurignacian of the Swabian Jura, this region can be viewed, within a polycentric framework, as one key center of cultural innovation during the early Upper Paleolithic" (N.J. Conard 2011). Other potential centers of innovation are located, for instance, in northern Italy, in southwestern France and, following recent research, perhaps in the Balkans. The data from the Swabian Jura is consistent with the model of modern humans using the Danube Corridor as one main route of early Upper Paleolithic dispersals into central Europe (N.J. Conard and M. Bolus 2003).

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