The cultural context of the Aurignacian of the Swabian Jura

MICHAEL BOLUS

ABSTRACT With rich cave sites in the Lone and Ach Valleys, the Swabian Jura represents the most important find province for the Aurignacian in Germany. Special attention is paid to Geissenklösterle cave which up to the present has yielded the best studied Aurignacian assemblages of the region. With a marked blade technology and typical stone tool-types, as well as the presence of organic artifacts and objects of personal ornamentation, the lower Aurignacian horizon from this site represents a fully developed Aurignacian and constitutes, according to TL and radiocarbon dates, one of the oldest Aurignacian industries in all of Europe. From a technological viewpoint, the upper Aurignacian developed out of the lower one. Special characteristics are the many organic artifacts, an increase in personal ornamentation, and, finally, the presence of ivory figurines and bone flutes that are among the oldest of their kinds worldwide. The best parallels can be found in the Aurignacian layers of other Swabian sites, such as Hohlenstein-Stadel and Vogelherd, where the oldest remains of modern *Homo sapiens sapiens* in Europe have been discovered. Recent excavations at Hohle Fels near Schelklingen have yielded an important, well stratified and subdivided Aurignacian horizon with art objects comparable to those from Vogelherd and Geissenklösterle.

Introduction

The distribution of Aurignacian sites in Germany shows distinct concentrations, and the map published by Joachim Hahn in his pioneering synthesis on the central and east European Aurignacian is, in general terms, still valid (Hahn, 1977). One of the centers, with the site of Lommersum, is situated in the Rhineland in a broader sense, the second one comprises parts of eastern Germany where, however, the assemblages are generally small and sometimes labeled as Aurignacian without full certainty. The largest cluster can be found in southern Germany, especially alongside the Danube. Apart from several Bavarian sites, the Swabian Jura represents the richest find province for the Aurignacian in Germany.

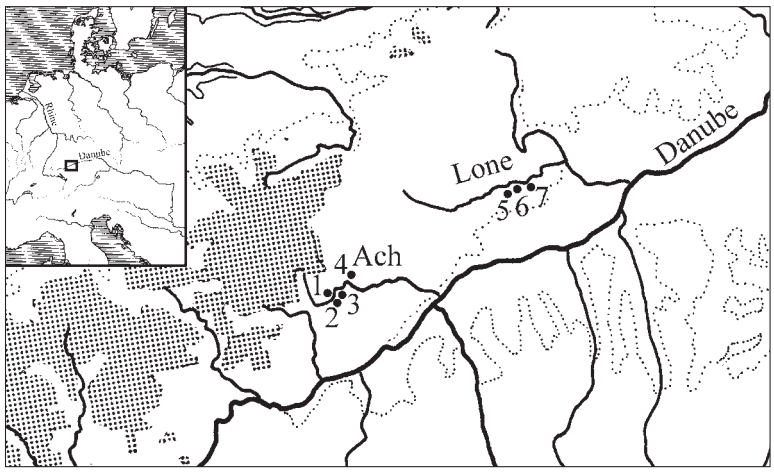

FIG. 1 – Map of southwestern Germany with the Aurignacian sites mentioned in the text. Ach Valley: 1. Sirgenstein; 2. Hohle Fels; 3. Geissenklösterle; 4. Brillenhöhle. Lone Valley: 5. Bockstein (Bocksteinhöhle and Bockstein-Törle; 6. Hohlenstein (Stadel and Bärenhöhle); 7. Vogelherd.

Important cave sites with long stratigraphies, often containing several Aurignacian layers, are situated in both the Ach and Lone Valleys. Bocksteinhöhle, Bockstein-Törle, Hohlenstein-Stadel, Hohlenstein-Bärenhöhle, and Vogelherd are in the Lone Valley. Brillenhöhle, Sirgenstein, Geissenklösterle, and Hohle Fels are in the Ach Valley (Fig. 1).

In this paper, I will try to characterize the Aurignacian of the Swabian Jura, concentrating on the cultural context. Conard and Bolus (2003) and Conard et al. (this volume) discuss in detail the problems with dating the Aurignacian and determining its chronostratigraphic position and Liolios while Teyssandier (this volume) provides further details concerning its lithic and bone technologies.

A short history of research

The first Aurignacian artifacts from the Swabian Jura, including perforated cave bear canines, were excavated by Ludwig Bürger in the Bocksteinhöhle in the 1880's (Bürger, 1892). Pioneering research on the Aurignacian in southern Germany was carried out by Robert Rudolf Schmidt when excavating Sirgenstein cave in 1906. His results were published in 1910 (Schmidt, 1910) and served as a basis for his fundamental monograph *Die diluviale Vorzeit Deutschlands*, published in 1912 (Schmidt, 1912).

The Aurignacian site with most abundant finds so far excavated in southern Germany is Vogelherd cave, where Gustav Riek found two rich Aurignacian horizons (Riek, 1934). More recently, it is Joachim Hahn's name that has become closely associated with Aurignacian research in general and especially in southwestern Germany. His excavations in Geissenklösterle cave, where he found two rich Aurignacian horizons, are internationally known.

Following Hahn's death in 1997, excavations at Hohle Fels near Schelklingen, only 3 km away from Geissenklösterle, continued under the direction of Nicholas Conard and Hans-Peter Uerpmann. An Aurignacian sequence with clear subdivisions, which Hahn had only touched in its uppermost part in the 1970's, has been excavated since 2001. Thus, for the first time in ten years, a well-stratified Aurignacian can be studied in southwestern Germany.

The Geissenklösterle Aurignacian

Fieldwork was carried out in Geissenklösterle cave by Joachim Hahn and others between 1973 and 1991, and has been continued since 2000 by Nicholas Conard and colleagues. These excavations uncovered a long stratigraphy comprising layers from the Middle Paleolithic to the Mesolithic, as well as other Holocene material, thus providing the best studied sequence in the Swabian Jura. While the Middle Paleolithic yielded only few tools, generally bearing cryo-retouch, the Gravettian and Aurignacian layers were especially rich in finds.

The Aurignacian can be subdivided into a lower and an upper Aurignacian. A series of dates based on the TL signal of burnt flint yielded an age of about 40 000 BP for the lower Aurignacian and an age of about 38 000 BP for the upper Aurignacian (Richter et al., 2000). Moreover, we have several dozens of radiocarbon dates, both conventional and AMS dates. If one excludes obvious outliers and dates on cave bear bones and other non-archeological materials, there are 33 dates from five different laboratories for several subunits of

the lower Aurignacian complex III and the upper Aurignacian complex II. Although some radiocarbon dates are about as old as the TL dates, on average the AMS dates are about 2000 years younger for each Aurignacian horizon respectively (Conard and Bolus, 2003; see also Conard et al., this volume).

Both horizons yielded evident settlement features, the most outstanding feature of the lower Aurignacian being a fireplace, which Hahn did not excavate entirely and which was further investigated during the new excavations in 2001 (Hahn, 1988, 1989; Conard and Malina, 2002). For the upper Aurignacian, a large concentration of burnt bones should be mentioned (Hahn, 1988).

The stone knapping technique is very similar in both horizons. Basically, the Aurignacians used a relatively simple, but marked, unidirectional blade production technique. The toolkit is similar in both horizons, but the percentages of special tool-types differ significantly. Carinated and nosed end scrapers appear much more often in the lower Aurignacian, where splintered pieces are rare. Burins nearly reach the same numbers in both horizons. The upper Aurignacian is dominated by simple endscrapers, and splintered pieces by far outnumber those of the lower Aurignacian. There are several busked burins. It is only in the upper Aurignacian that very small numbers of Dufour bladelets appear (Figs. 2-3).

In the lower Aurignacian, most organic artifacts are projectile points and carefully worked ivory rods, but there is also one antler hammer. The large amount of ivory working debris is striking and suggests the manufacture of an important number of organic artifacts. Projectile points with split bases appear only in the upper Aurignacian. All in all, the range of organic artifacts is more diverse in the Geissenklösterle II assemblage, which features one *bâton percé* made of ivory (Figs. 2-3).

The lower Aurignacian yielded a diverse array of pendants, ten in total: there are elongated and tear-shaped pieces made of ivory, as well as perforated fox canines (Fig. 2). In addition, one worked fragment of soapstone from the same complex may also be interpreted as the remains of a pendant (Conrad, 2003). Most pieces mentioned had been found near the fireplace or in the fireplace itself (Hahn, 1989, 1992). The objects of personal ornamentation in the upper Aurignacian are dominated by double perforated ivory beads, their number now reaching nearly one dozen. No parallels exist for a large retoucher-like pendant made of reindeer antler (Fig. 3). In the context of ornamental objects, decorated antler rods with regular incisions at the rim must also be mentioned. Finally, there are some fish vertebrae which have been perforated to be used as pendants and which have been colored red intentionally.

Until now, art objects only appear in the upper Aurignacian (Fig. 3). These four ivory figurines (including the relief with the upright standing anthropomorphic figurine with carefully carved notches along the edges and regularly carved depressions on the backside) are well known (Hahn, 1986). Belonging to the same context are two flutes made of swan bones, which, like the art objects mentioned above, are among the oldest of their kind worldwide (Hahn and Münzel, 1995).

There has been some confusion and debate about the character of the lower Aurignacian of Geissenklösterle cave. Hahn described the assemblage as Proto-Aurignacian, primarily because of the numerous carinated and nosed endscrapers, the relative scarcity of retouched blades, the lack of points with split bases and, above all, because of its stratigraphic position below an Aurignacian assemblage with points with split bases (Hahn, 1988, 1996). On the contrary, Nicholas Conard and I have argued that the Geissenklösterle III assemblage is in every respect Aurignacian in character, even if without art objects (Bolus and Conard, 2001; Conard and Bolus, 2003), while Janusz Kozłowski and Marcel Otte have placed this layer into their Pre-Aurignacian group, together with the Bachokirian

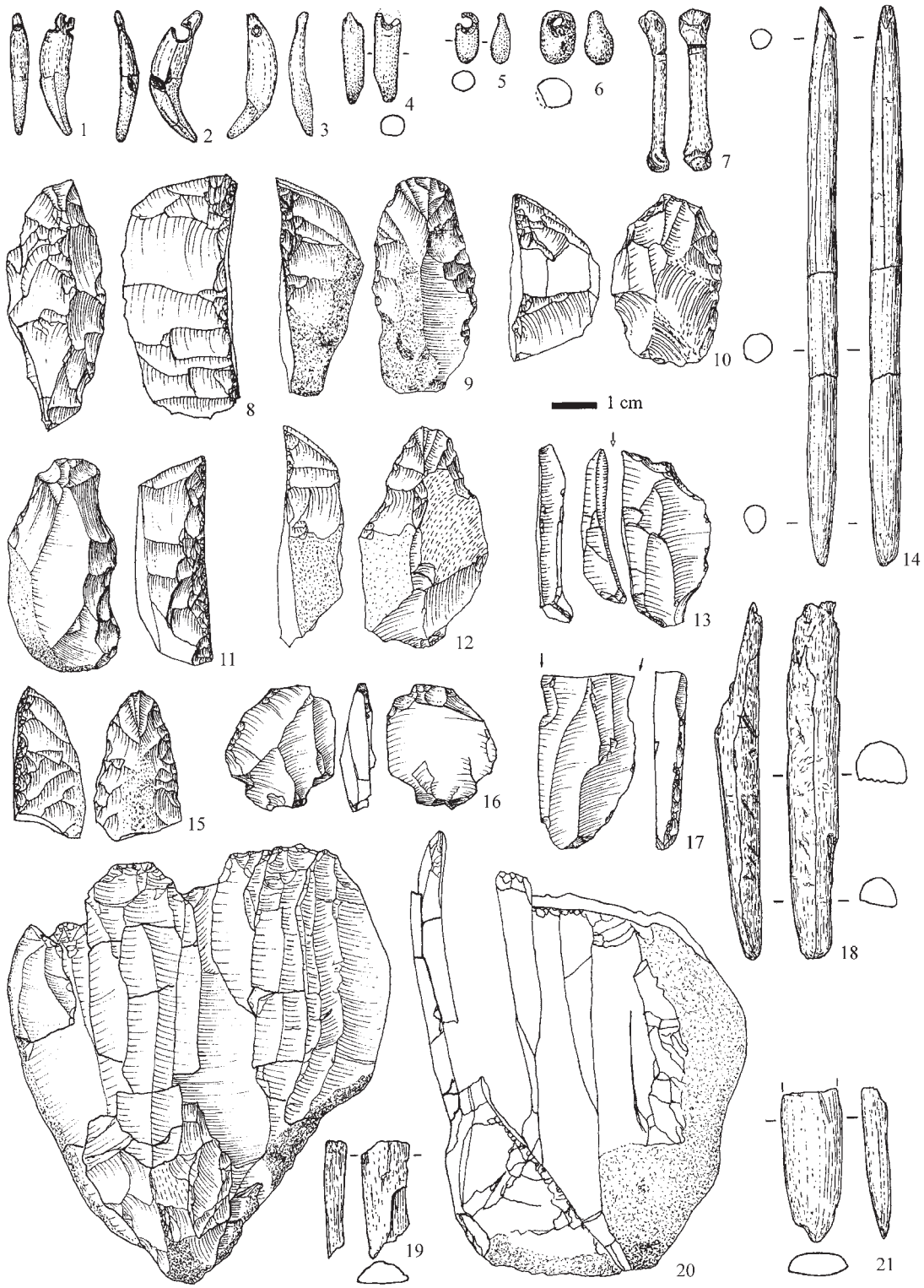

FIG. 2 – Aurignacian of Geissenklösterle, Archeological Horizon III. 1-3. perforated fox canines; 4-5. ivory pendants; 6. ivory bead; 7. grooved bone; 8. artifact resembling a carinated endscraper; 9-10. carinated endscrapers; 11-12. nosed endscrapers; 13, 17. burins; 14, 21. bone points; 15. endscraper; 16. splintered piece; 18. ivory rod (projectile point?); 19. worked ivory splinter; 20. blade core with refitted blades. After Hahn, 1988 (1-2, 4-5, 7-21) and Hahn, 1989 (3, 6).

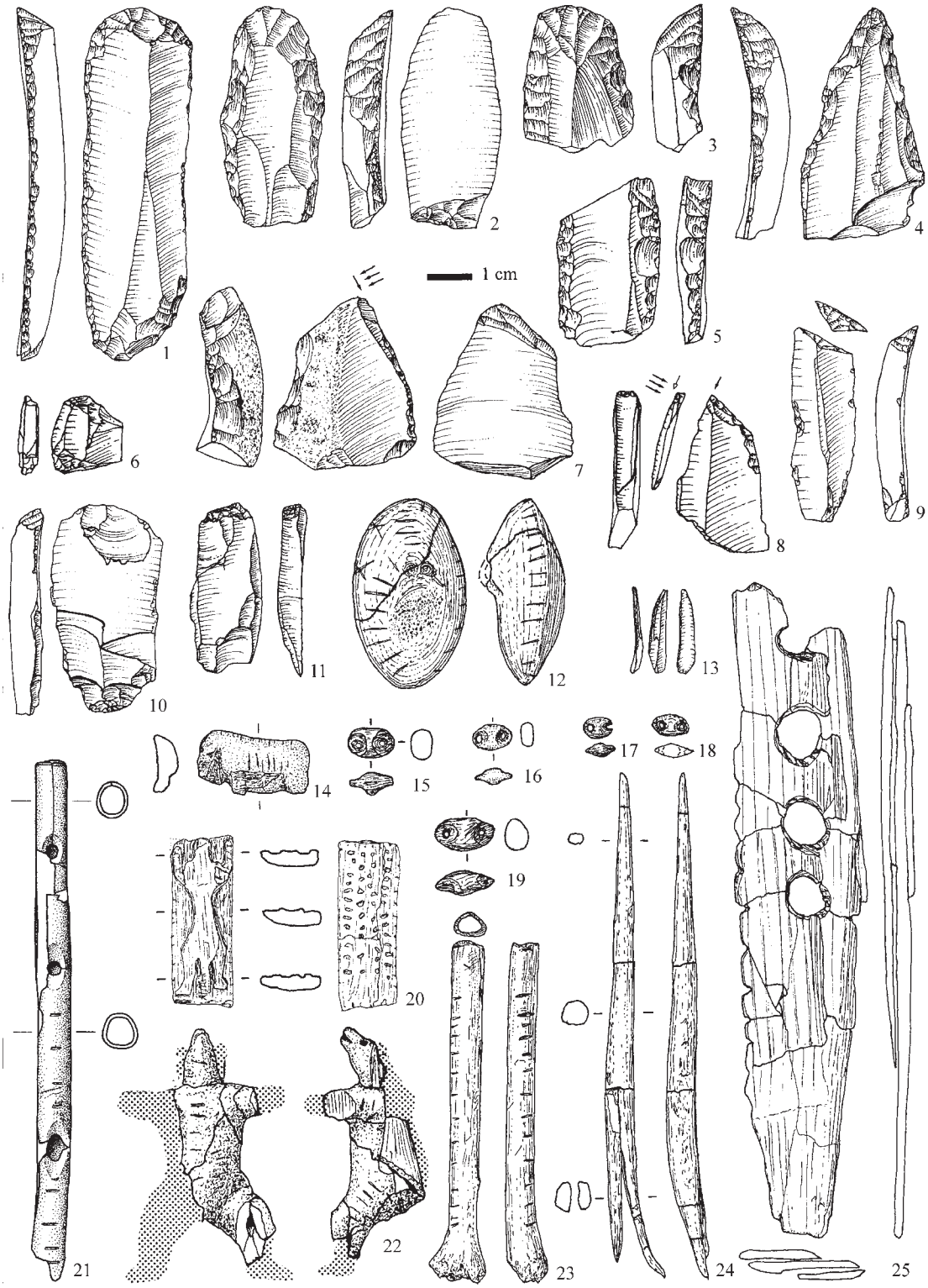

FIG. 3 – Aurignacian of Geissenklösterle, Archeological Horizon II. 1-3. endscrapers; 4. pointed blade; 5. laterally retouched blade; 6, 10-11. splintered pieces; 7. busked burin; 8. burin on truncation; 9. truncated blade; 12. antler pendant; 13. Dufour bladelet; 14, 20, 22. ivory figurines; 15-19. double perforated ivory beads; 21. bone flute; 23. decorated bone; 24. bone point with split base; 25. *bâton percé* of ivory. After Hahn, 1986 (14, 20, 22), Hahn, 1988 (1-13, 15-19, 23-25), and Conard and Bolus, 2003 (21).

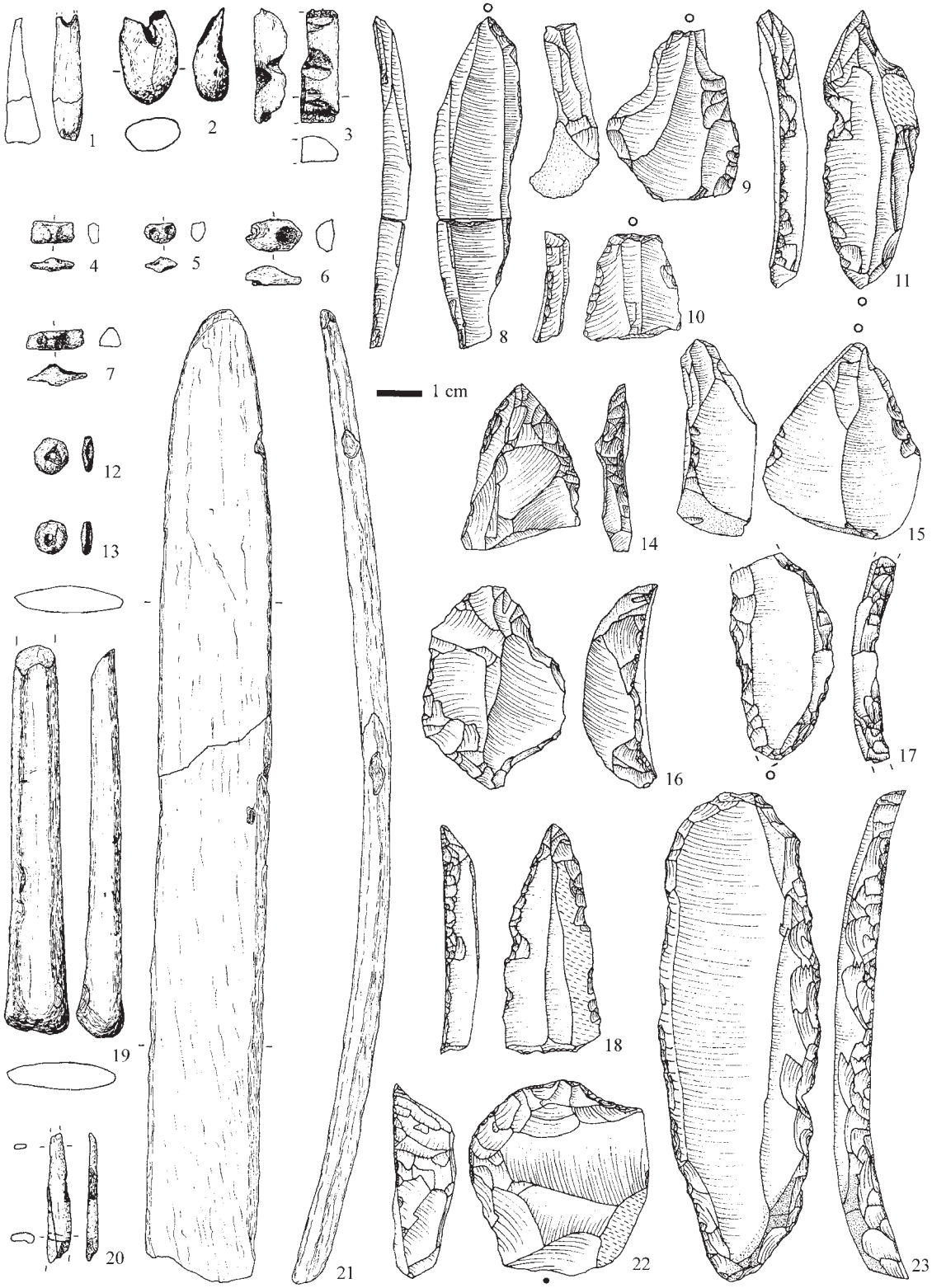

FIG. 4 – Aurignacian of Hohle Fels near Schelklingen. Archeological Horizon III (1, 9-11, 15, 19, 21), Archeological Horizon IV (2-8, 12-14, 16-18, 20), and Archeological Horizon V (22-23). 1. perforated bear incisor; 2. perforated upper eyetooth from red deer; 3. roughout for ivory beads; 4. half-finished ivory bead; 5-7. double perforated ivory beads; 8-9. burins; 10. truncated blade; 11. busked burin; 12-13. disc-shaped ivory beads; 14. pointed blade; 15. carinated burin; 16. double nosed endscraper; 17. blade with Aurignacian retouch; 18. blade pointed at one end and truncated at the other; 19. bone awl with intense polishing; 20. fragment of a bone point; 21. worked mammoth rib; 22. nosed endscraper; 23. endscraper combined with a pointed end. After Conard and Bolus, 2003.

assemblages, erroneously suggesting a lack of carinated endscrapers and bone points (Kozłowski and Otte, 2000). In recent years, João Zilhão and Francesco d'Errico have in numerous publications disputed the Aurignacian character of Archeological Horizon III, and argued — sometimes based on incorrect information — that the key Aurignacian artifacts in horizon III, especially the ornaments and bone tools, are due to a mixing from the overlying Aurignacian assemblage (Zilhão and d'Errico, 1999; Zilhão, 2001; see also Conard and Bolus, 2003).

Other Aurignacian sites in southwestern Germany

The closest parallel for the upper Aurignacian of Geissenklösterle in southwestern Germany, not only because of the presence of art objects, is represented by Aurignacian layer V of Vogelherd cave, in the Lone Valley, while Aurignacian layer IV from this site seems to show more affinities with the much earlier Geissenklösterle III Aurignacian (Riek, 1934; Hahn, 1977, 1988). AMS dates recently measured at Prime Lab at Purdue University suggest that layer V from Vogelherd may be up to 36 000 years old, while layer IV is up to now only poorly dated, the oldest (conventional ^{14}C) results falling in the range of 31 000 BP (Conard and Bolus, 2003).

Because of the famous *Löwenmensch* figurine, the Aurignacian of Hohlenstein-Stadel may be added to this group, although the stone artifacts show some similarities with the lower Geissenklösterle Aurignacian (Hahn, 1988). Dates for the Aurignacian from Hohlenstein-Stadel lie in the range of about 32-33 000 BP, which means that they are somewhat younger than those for the upper Aurignacian of Geissenklösterle.

The Aurignacian from Sirgenstein cave is characterized by bone points with simple bases and a dominance of endscrapers (Schmidt, 1912; Hahn, 1977); it reveals certain similarities with the lower Aurignacian from Geissenklösterle rather than with the upper Aurignacian. New dates for the Sirgenstein Aurignacian, the first ever obtained for this site, fall in the range between around 27 000 BP (layer V) and 30 500 BP (layer VI), thus being distinctly younger than those for the Geissenklösterle III Aurignacian.

New results from the current excavations at Hohle Fels considerably enlarge our knowledge of the Aurignacian in southwestern Germany. In 1999, the fragment of an ivory figurine was discovered in a transitional horizon between the Gravettian and the Aurignacian. Two bones from the immediate vicinity of the figurine produced dates of ca. 30 000 BP that fall into a time period when the earliest Gravettian in the region is already appearing. Depicting an animal head, the art object can, for stylistic reasons, be compared with the figurines from Geissenklösterle and Vogelherd (Conard and Floss, 2000). In the summer of 2001, a well stratified Aurignacian horizon with clear subdivisions was uncovered in the cave, and the excavation team is still excavating in these Aurignacian layers. Obviously no significant vertical disturbances appeared within these subdivisions. One of the lowermost of these layers, Geological Horizon 7, produced a hearth-like concentration of burnt bones. The Aurignacian finds include typical stone tools, such as carinated and busked burins, nosed and carinated scrapers, and laterally retouched blades. Moreover, objects of personal ornamentation, among them double perforated ivory beads similar to those from Geissenklösterle and Sirgenstein caves, as well as different organic tools, were also found (Fig. 4). The presence of another fragmentary ivory relief which seems to depict a bird is noteworthy (Conard et al., 2002). Absolute dates for the Hohle Fels Aurignacian have not yet been obtained.

The other, often small, Aurignacian assemblages from the Swabian Jura, such as those from Bocksteinhöhle, Bockstein-Törle, and Hohlenstein-Bärenhöhle in the Lone Valley, and Brillenhöhle in the Ach valley, will not be discussed here (for further information see Conard and Bolus, 2003).

Human remains from the Swabian Aurignacian

While the Middle Paleolithic of southwestern Germany was produced by Neandertals as is indicated by a Neandertal femur found in the *Schwarzes Moustérien* of Hohlenstein-Stadel (Kunter and Wahl, 1992), we have to ask which human form manufactured the artifacts from the earliest phase of the Upper Paleolithic (Table 1).

TABLE 1
Human remains from Middle Paleolithic and Aurignacian deposits of the Lone and Ach Valleys in the Swabian Jura.

Site	Archeological Horizon	Fossil	Anthropological Determination	Archeological Context	References
LONE VALLEY					
Hohlenstein-Stadel					
	Schwarzes Moustérien	diaphysis of a right femur	Neandertal male? adult	Mousterian	Völzing, 1938 Kunter and Wahl, 1992
	19-20 m spit 6	premolar	modern *H. s.*? young adult	Aurignacian	Hahn, 1977
Vogelherd					
	V (basis)	Stetten 1 cranium + mandible 2 lumbar vertebrae	modern *H. s.* male adult	Aurignacian	Riek, 1932 Gieseler, 1937 Czarnetzki, 1983
	V (basis)	Stetten 3 humerus	modern *H. s.* male	Aurignacian	Gieseler, 1937 Churchill and Smith, 2000
	V (basis)	Stetten 4 left metacarpal	modern *H. s.*	Aurignacian	Czarnetzki, 1983
	IV (top)	Stetten 2 cranium	modern *H. s.* male young adult	?	Riek, 1932 Gieseler, 1937 Czarnetzki, 1983
ACH VALLEY					
Sirgenstein					
	VI	left upper canine left lower molar	modern *H. s.* adult	Aurignacian	Schmidt, 1910 Schliz, 1912
	VI	right upper canine	modern *H. s.* adult	Aurignacian	Schmidt, 1910 Schliz, 1912

One isolated premolar belonging presumably to a modern human comes from the immediate vicinity of the *Löwenmensch* figurine in Hohlenstein-Stadel (Hahn, 1977), while three human teeth from most probably two anatomically modern human individuals were found in 1906 by R. R. Schmidt within the lowest Aurignacian layer VI of Sirgenstein cave (Schliz, 1912).

The most important human fossils from the Aurignacian in southwestern Germany, however, were discovered by Gustav Riek at the basis of the Aurignacian layer V of Vogel-

herd cave in 1931, consisting of a well-preserved skull known as Stetten 1 and the remains of probably two other individuals referred to as Stetten 3 and Stetten 4 (Riek, 1932; Gieseler, 1937; Czarnetzki, 1983; Churchill and Smith, 2000). A second skull, Stetten 2, was found at the top of layer IV, but its exact cultural affiliation is unclear (Riek, 1932; Gieseler, 1937). With the new Vogelherd dates mentioned above, the human bones from layer V are the oldest fossils of modern *Homo sapiens sapiens* clearly associated with an Aurignacian assemblage in Europe. Since the Aurignacian layer IV is overlying layer V, this means that anatomically modern humans are at least responsible for the Aurignacian of Vogelherd and, by analogy, of Geissenklösterle II type, but because of the obvious cultural continuity between the Aurignacian horizons of the latter site it is plausible that *Homo sapiens sapiens* can in the same way be held responsible for the Aurignacian of Geissenklösterle III type.

Conclusions

What conclusions can be drawn from the data presented? Considering the Geissenklösterle III Aurignacian on the one hand and the Sirgenstein V Aurignacian on the other hand, we have got cornerstones in southern Germany which document a life span of the local Aurignacian over some 10 000 years. During this time period, it is obvious that both the Ach Valley and the Lone Valley were frequently visited by man, as the numerous dates for the Swabian Aurignacian indicate (see Conard and Bolus, 2003). Traditions were maintained over extended periods of time, as is documented by the ivory figurines from Geissenklösterle cave, on one hand, and the ivory figurine from the transitional layer at Hohle Fels, on the other. This fits the fact that the assemblage from the lower Geissenklösterle Aurignacian, some 37-40 000 years old, finds its best, if any, parallels in the Aurignacian of Vogelherd IV, perhaps 31 000 years old, and in the assemblages from Sirgenstein cave, some 27-30 500 years old, while the upper Geissenklösterle Aurignacian can be easily compared with Vogelherd V. The 32-33 000 year old Aurignacian of Hohlenstein-Stadel holds a somewhat intermediate position, with the *Löwenmensch* figurine evoking the Aurignacian of Geissenklösterle II and Vogelherd V type, whereas the artifact assemblage is more like the Aurignacian of Geissenklösterle III and Vogelherd IV type. This indicates that the characteristics of assemblages of, for instance, Geissenklösterle III type, such as the lack of art objects, do not originate in chronological differences but rather have to be explained in terms of functional variability. This, in return, strengthens a point frequently made by Hahn: that one has to be cautious with chronostratigraphic interpretations based merely on typology. Moreover, this means that Zilhão and d'Errico are wrong in refusing to accept Geissenklösterle III as true Aurignacian and, finally, that Kozłowski's and Otte's term "Pre-Aurignacian" must be rejected for Geissenklösterle.

Series of dates for both the subdivisions of the new Aurignacian horizon in Hohle Fels and for the newly excavated material from Geissenklösterle are in preparation. In addition, micro-morphological analyses are being carried out at both sites with the help of Paul Goldberg from Boston University. Thus, it will be possible to gain detailed information concerning the genesis of the sites. In combination with the analysis of the archeological finds and with further dating of the other sites, such as Sirgenstein, it will be possible to improve the chronostratigraphy for the Aurignacian of southern Germany and, especially, to better understand the transitions from the Middle Paleolithic to the Aurignacian and from the Aurignacian to the Gravettian.

Acknowledgments

I would like to thank Nicholas Conard and Nicolas Teyssandier for productive discussions and Marc Händel for technical support.

REFERENCES

BOLUS, M.; CONARD, N. J. (2001) - The late Middle Paleolithic and earliest Upper Paleolithic in Central Europe and their relevance for the Out of Africa hypothesis. *Quaternary International*. Oxford. 75, p. 29-40.

BÜRGER, L. (1892) - Der Bockstein, das Fohlenhaus, der Salzbühl, drei prähistorische Wohnstätten im Lonethal. *Mitteilungen des Vereins für Kunst und Altertum in Ulm und Oberschwaben*. Ulm. 3.

CHURCHILL, S. E.; SMITH, F. H. (2000) - A Modern Human Humerus From the Early Aurignacian of Vogelherdhöhle (Stetten, Germany). *American Journal of Physical Anthropology*. New York. 112, p. 251-273.

CONARD, N. J. (2003) - Eiszeitlicher Schmuck auf der Schwäbischen Alb. In KÖLBL, S.; CONARD, N. J., eds. - *Eiszeitschmuck. Status und Schönheit*. Museumsheft 6. Blaubeuren: Urgeschichtliches Museum, p. 15-49.

CONARD, N. J.; BOLUS, M. (2003) - Radiocarbon dating the appearance of modern humans and timing of cultural innovations in europe: new results and new challenges. *Journal of Human Evolution*. London. 44, p. 331-371.

CONARD, N. J.; FLOSS, H. (2000) - Eine Elfenbeinplastik vom Hohle Fels bei Schelklingen und ihre Bedeutung für die Entwicklung des Jungpaläolithikums in Südwestdeutschland. *Archäologisches Korrespondenzblatt*. Mainz. 30, p. 473-480.

CONARD, N. J.; LANGGUTH, K.; UERPMANN, H.-P. (2002) - Neue Aurignacien-Fundschichten im Hohle Fels bei Schelklingen Alb-Donau-Kreis. *Archäologische Ausgrabungen in Baden-Württemberg 2001*. Stuttgart. p. 21-26.

CONARD, N. J.; MALINA, M. (2002) - Neue Ausgrabungen in den untersten Schichten des Aurignacien und des Mittelpaläolithikums im Geissenklösterle bei Blaubeuren Alb-Donau-Kreis. *Archäologische Ausgrabungen in Baden-Württemberg 2001*. Stuttgart. p. 16-21.

CZARNETZKI, A. (1983) - Zur Entwicklung des Menschen in Südwestdeutschland. In MÜLLER-BECK, H., ed. - *Urgeschichte in Baden-Württemberg*. Stuttgart: Konrad Theiss Verlag, p. 217-240.

GIESELER, W. (1937) - Bericht über die jungpaläolithischen Skelettreste von Stetten ob Lontal bei Ulm. *Verhandlungen der Gesellschaft für Physische Anthropologie*. Suttgart. 8, p. 41-48.

HAHN, J. (1977) - *Aurignacien, das ältere Jungpaläolithikum in Mittel- und Osteuropa*. Köln/Wien: Böhlau-Verlag.

HAHN, J. (1986) - *Kraft und Aggression. Die Botschaft der Eiszeitkunst im Aurignacien Süddeutschlands?* Tübingen: Universität (Archaeologica Venatoria; 7).

HAHN, J. (1988) - *Die Geissenklösterle-Höhle im Achtal bei Blaubeuren I. Fundhorizontbildung und Besiedlung im Mittelpaläolithikum und im Aurignacien*. Stuttgart: Konrad Theiss Verlag.

HAHN, J. (1989) - Zur Funktion einer Aurignacien-Feuerstelle aus dem Geissenklösterle bei Blaubeuren. *Fundberichte aus Baden-Württemberg*. Stuttgart. 14, p. 1-22.

HAHN, J. (1992) - *Eiszeitschmuck auf der Schwäbischen Alb*. Ulm: Süddeutsche Verlagsgesellschaft.

HAHN, J. (1996) - L'origine du Paléolithique supérieur en Europe centrale: les datations C^{14}. In CABRERA VALDÉS, V., ed. - *El origen del hombre moderno en el suroeste de Europa*. Madrid: Universidad Nacional de Educación a Distancia, p. 61-80

HAHN, J.; MÜNZEL, S. (1995) - Knochenflöten aus dem Aurignacien des Geissenklösterle bei Blaubeuren, Alb-Donau-Kreis. *Fundberichte aus Baden-Württemberg*. Stuttgart. 20, p. 1-12.

KOZŁOWSKI, J.; OTTE, M. (2000) - The Formation of the Aurignacian in Europe. *Journal of Anthropological Research*. Albuquerque. 56, p. 513-534.

KUNTER, M.; WAHL, J. (1992) - Das Femurfragment eines Neandertalers aus der Stadelhöhle des Hohlensteins im Lonetal. *Fundberichte aus Baden-Württemberg*. Stuttgart. 17:1, p. 111-124.

RICHTER, D.; WAIBLINGER, J.; RINK, W. J.; WAGNER, G. A. (2000) - Thermoluminescence, Electron Spin Resonance and ^{14}C -dating of the Late Middle and Early Upper Palaeolithic Site of Geissenklösterle Cave in Southern Germany. *Journal of Archaeological Science*. London. 27, p. 71-89.

RIEK, G. (1932) - Paläolithische Station mit Tierplastiken und menschlichen Skelettresten bei Stetten ob Lontal. *Germania*. Frankfurt. 16, p. 1-8.

RIEK, G. (1934) - *Die Eiszeitjägerstation am Vogelherd im Lonetal I: Die Kulturen*. Tübingen: Akademische Buchhandlung Franz F. Heine.

SCHLIZ, A. (1912) - Die diluvialen Menschenreste Deutschlands. In SCHMIDT, R. R. - *Die diluviale Vorzeit Deutschland*. Stuttgart: E. Schweizerbartsche Verlagsbuchhandlung, vol. 1, p. 231-256

SCHMIDT, R. R. (1910) - *Der Sirgenstein und die diluvialen Kulturstätten Württembergs*. Stuttgart: E. Schweizerbartsche Verlagsbuchhandlung.

SCHMIDT, R. R. (1912) - *Die diluviale Vorzeit Deutschlands*. With contributions by E. KOKEN; A. SCHLIZ. Stuttgart: E. Schweizerbartsche Verlagsbuchhandlung. 3 vols.

VÖLZING, O. (1938) - Die Grabungen 1937 am Hohlestein im Lonetal. Markung Asselfingen, Kr. Ulm. *Fundberichte aus Schwaben*. Stuttgart. Neue Folge. 9, p. 1-7.

ZILHÃO, J. (2001) - *Anatomically Archaic, Behaviorally Modern: The Last Neanderthals and Their Destiny*. Kroon-Voordracht, Amsterdam: Joh. Enschedé. 23.

ZILHÃO, J.; D'ERRICO, F. (1999) - The Chronology and Taphonomy of the Earliest Aurignacian and Its Implications for the Understanding of Neandertal Extinction. *Journal of World Prehistory*. New York. 13, p. 1-68.