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CONSIDERATIONS ON THE AURIGNACIAN INDUSTRIES FROM KREMS-HUNDSSTEIG IN THE MIDDLE DANUBE BASIN AND FUMANE IN THE ADIGE BASIN*

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1. Introduction

The authors who have studied the Aurignacian in Central Europe (HAHN 1979) and in the middle Danube basin (BROGLIO & LAPLACE 1966) have constantly highlighted the radical difference between the industry from Krems-Hundssteig and all the other Aurignacian industries; this difference lies essentially in the high percentage and in the polymorphism of bladelet tools, which was well described at the beginning of the century by H. Obermaier (STROBL & OBERMAIER 1909). The discovery of an Aurignacian industry with similar characteristics at Grotta di Fumane, in Veneto (BARTOLOMEI *et al.* 1992; BROGLIO *et al.* 1998) recalls our attention to the industry at Krems and raises the problem of the Aurignacian industries with bladelet armatures. Another similarity between Krems and Fumane is the presence of contemporary seashells from the Mediterranean at both sites, despite their distance from the sea (450 and 90 km respectively from the closest point on the current Adriatic coast: the distances were much greater during isotope stage 3) (VON TROLL *In:* STROBL & OBERMAIER 1909; FIOCCHI 1997). As far as Krems is concerned, this is the only site in Central Europe which is characterised by the presence of seashells which were collected along the Mediterranean coast, and this fact accentuates the exceptional nature of the site in the context of the Aurignacian in central Europe.

2. Krems-Hundssteig

The lithic assemblage from this site was collected between 1893 and the beginning of this century from a homogeneous archaeological deposit in a bank of loess (STROBL & OBERMAIER 1909: 139) which was dated more than fifty years later to 35,500±2,000 (KN-I.654, conventional radiocarbon). The mammals at the site are mainly horse, reindeer and mammoth; the fauna also includes the rock ptarmigan. The collections housed at the Historisches Museum at Krems, and at the Naturhistoriches Museum and Niederösterreichisches Landesmuseum in Vienna consist of 363 cores, 1397 tools, 2186 bladelet armatures, some tens of thousands of unretouched pieces, two points (one made of ivory, the other of bone) and part of the 128 seashells (some of them fossil, others contemporary with the site and of Mediterranean origin) listed by O. von Troll in an appendix to the work by J. Strobl and H. Obermaier (BROGLIO & LAPLACE 1966; LAPLACE 1970). H. Obermaier indicates that about 20,000 lithic artifacts were found; however, some cases of artifacts were recently found in the stores at the Krems Museum which still bear the original handwriting of H. Obermaier; a quick evaluation raises the total number of lithic artifacts to about 70,000. The majority of these are unretouched pieces and faunal remains, including some mammoth bones decorated with notches or painted (NEUGEBAUER-MARESCH 1996). Taking into account the mode of collection

of the finds reported by H. Obermaier, it seems that these artifacts correspond to the lithic assemblage from a large sector of the site and that they are representative of the industry as a whole, which H. Obermaier attributed to the Aurignacian. The lithic raw material used was flint, jasper and quartz which was procured from the Danube alluvium near the site. The cores, which are predominantly carinated with a single striking platform, were mainly used for the production of bladelets and microbladelets; there are also pyramidal cores, prismatic cores with one or two striking platforms, and flake cores with "flat" scars.

The three collections include 3624 retouched artifacts: 117 burins, 400 endscrapers, 481 retouched blades, 129 sidescrapers, a few substrate tools and 2091 bladelet armatures. The classic Aurignacian forms are mainly represented by endscrapers (endscrapers on Aurignacian blade, ogival endscrapers and nosed endscrapers; carinated nosed endscrapers) and Aurignacian blades; only two of the burins have stopping retouch and none of them have a carinated biseau. The characteristic feature of the industry is the bladelet tools, which consist of 146 points with marginal or invasive abrupt retouch, 1922 bladelets with marginal or invasive abrupt retouch, 21 truncated bladelets with abrupt retouch and 2 segments; these represent 58 % of the retouched artifacts.

3. The Aurignacian occupation at Grotta di Fumane

The upper part of the deposit at Grotta di Fumane (units A and D), which lies at 350 meters above sea-level in the Lessini Mountains (Veneto Prealps), is constituted by cryoclastic breccia with aeolian sediments; the palaeontological content reflects a relatively temperate and humid environment (subunits A11-A3) which becomes progressively colder and more arid (subunits A2-A1 and D7-D3b) and then markedly more humid as signalled by a pedogenetic episode (D3a). The series ends with landslide deposits and colluvium (D1). In the sequence from A11 to D3 the mammals are mainly ibex, red deer and roe deer, and the variations in the percentages of these species (which concord with the palaeobotanic, micromammal and ornithological data) can be attributed to the climatic oscillations which took place in the second part of the Würm Interpleniglacial. The lower subunits (down to A4) produced a lithic assemblage which falls within the technological and typological context of the Mousterian, while the upper subunits A3-D3 produced Aurignacian assemblages with a large bladelet component (BARTOLOMEI *et al.* 1992; BROGLIO *et al.* 1996). The radiocarbon dates (AMS) give the Aurignacian levels an age comprised between 37,000-35,000 and 32,000 BP (BROGLIO & IMPROTA 1995). In previous articles it has been highlighted that there was a clear transition between the Mousterian and Aurignacian levels, despite the absence of a hiatus in the stratigraphic series: the differences concern the living structures, the hunting techniques, the manufacture of flint and bone tools, and the introduction of ornamental and decorated objects (BROGLIO in press).

Here we are concerned with the lithic assemblage from the area excavated during the first years of the excavation (1988-1992), which consists of 92 cores, 264 tools and 1056 bladelet armatures. The lithic raw material is flint from the Lessini Mountains (Ooliti di San Vigilio, Biancone, Scaglia Variegata, Scaglia Rossa and other Tertiary formations), which was procured from outcrops as well as from alluvial deposits near the site. The operational sequences were finalised towards the production of blades, bladelets and microbladelets. The nodule or block of flint was roughed out by means of bidirectional flake removals, thus creating a convex crest; part of the nodule was then removed, forming a striking platform. After the removal of one or more crested laminar

flakes, the exploitation of the core began, which consented the production of blades with a concave ventral face. The progressive flattening of the flaking surface sometimes led to the formation of prismatic cores, which were then used for the production of large bladelets. In other cases the blade core, which had now been exhausted, was broken into small pieces were then used as carinated cores for the production of small bladelets and microbladelets. There are also some flake cores with flat bladelet scars. The bladelets were mainly produced from prismatic cores with one striking platform and a planar flaking surface; there are however some prismatic cores with two opposed or orthogonal striking platforms. The microbladelets were nearly always made from carinated cores (cf. carinated scrapers and carinated nosed or shouldered scrapers), and more rarely from flake cores (cf. simple burins, retouched burins or burins on break).

In the sequence from Fumane the substrate tools are mainly represented by endscrapers (36-31 %), burins (20-13 %) and retouched blades. Flat types prevail among the endscrapers, and these are almost always made on laminar blanks (67-84 %); ogival, nosed, shouldered and carinated endscrapers are rare (the carinated types with bladelet scars are usually classified as cores). The majority of the burins are also made on laminar blanks; burins with a carinated biseau are very rare, and stopping retouch is present only exceptionally. Only a few of the retouched blades can be classified as Aurignacian blades. Finally there are also some splintered pieces. The whole of the sequence of bladelet tools is dominated by retouched pieces (86 % at the base, followed by 82 %, 58 %, 68 % and 59 %). These are represented by truncation-points, points with marginal or invasive abrupt retouch, bladelets with marginal or invasive abrupt retouch, and truncated bladelets with abrupt retouch.

4. The bladelet tools from the two sites

In both industries the bladelets and microbladelets mainly have a regular shape, with subparallel edges, a triangular or trapezoidal section and a slightly curved ventral face. These were usually given an abrupt retouch, of which the intensity varies between inframarginal and invasive; only rarely was simple retouch used.

Truncation-points

These are very rare, and have only been found at Fumane (4 examples: Fig. 2: 1, 2). Some of the bladelets with alternate or inverse marginal abrupt retouch have been truncated obliquely on the distal or proximal part of the blank; we believed it to be opportune to distinguish these from the partially backed points since the invasive abrupt retouch which forms the truncation does not extend along the edge of the blank. The bladelets are about 40 mm long; the only unbroken example is 44 mm long, with an elongation index of 5.9. The functional analysis of one of these tools revealed use wear traces on the opposite edge which suggested a cutting action; we could therefore consider them to be small backed knives (Fig. 2: 31).

Points with marginal abrupt retouch

These represent about 5 % of the bladelet tools at Krems, and 4 % at Fumane. They are characterised by an axial cusp on the distal part of the blank, at the point of convergence between the two series of marginal abrupt retouch (of which the intensity varies from inframarginal to semi-abrupt) which is normally direct (on about two thirds of the artifacts) or more rarely alternate (on about one third); the outline is bilateraly symmetrical (Figs. 1: 1-7; 2: 3-9). In the assemblage from Fumane there are two different size categories: microbladelet forms between 16 and 30 mm (mode ~20 mm), with an elongation index comprised between 3.1 and 5.4 (mode ~4.2);

and bladelet forms ~40 mm long, with an elongation index of ~5.

Partially backed points

These are very rare: 3 examples at Krems, and 4 at Fumane. They are made on bladelets of varying dimensions (L 23÷40 mm, elongation index 4.5÷5.8), and have direct invasive abrupt retouch with a curved orientation which is restricted to the distal part of the artifact; the point, which is always located at the distal end, is lateral with respect to the axis of the blank. There is always a marginal abrupt retouch, either direct or inverse, on the edge opposite the backed one (Figs. 1: 8; 2: 10-12).

Totally backed points

These are relatively infrequent, and account for just more than 1 % of the bladelet tools; they are however characteristic forms. The majority of them have direct bilateral abrupt retouch, which is invasive on one edge (the real backed edge) and marginal on the other; the cusp lies at the convergence between the two series of retouch, aligned with the axis of the blank. None of them have bipolar invasive abrupt retouch. At Fumane the backed points made on microbladelets are between 21 and 25 mm long, with an elongation index comprised between 4.2 and 4.9. Some fragments of backed points with similar typological characteristics are larger and can be attributed to bladelet forms (Figs. 1: 9-11; 2: 13-16).

Bladelets with abrupt retouch

Numerous bladelets and microbladelets (more than 90 % of the bladelet tools) have marginal abrupt retouch, which is usually parallel to the axis of the blank; the retouch is normally alternate (~75 %) or inverse, and very rarely direct, and varies in intensity from inframarginal to semi-abrupt. Some artifacts with the same characteristics have simple retouch. The microbladelets and bladelets generally have a regular shape, with a quite flat ventral face or more rarely a twisted ventral face. Some of the fragments may be backed bladelets (Figs. 1: 12-16, 18; 2: 22-24).

Truncated bladelets with abrupt retouch

A few of the bladelets with marginal abrupt retouch have a straight or oblique truncation (Figs. 1: 17, 19-20; 2: 25-26).

Geometric microliths

At Krems there are two segments (Fig. 1: 21).

The lithic assemblages at the two sites therefore include a large number of bladelets and microbladelets which have been retouched using two different schemes: either with two series of subparallel alternate marginal abrupt retouch; or with two series of marginal or invasive abrupt retouch, both of which are direct and which converge at the distal end of the blank thus forming a point.

The functional analysis of the bladelet tools from Fumane (C. Lemorini and P. Rossetti in BROGLIO *et al.* in press), revealed that more than a third (37 %) of the sample examined had been used as projectile weapons. The other armatures were used as cutting tools (47 %), for scraping or whittling (14 %) or for making grooves (2 %) on unresistant matter such as plants or meat, on resistant matter such as wood and skin, or on very resisitant matter such as bone and deer antler (Fig. 2: 29-31).

5. Considerations

The technical and typological analysis of the lithic assemblages from Krems and Fumane revealed some common characteristics: the morphology of the bladelet and microbladelet cores; the presence, in small quantities, of characteristic forms of the classic Aurignacian; the importance of the

bladelet tools, which are dominated by bladelets with marginal abrupt retouch; and the presence of points with marginal or invasive abrupt retouch. The main characteristic of the two assemblages is represented by the points with abrupt retouch, which are normally very rare in Aurignacian assemblages: for example, in the assemblage from level G at Riparo Mochi, which is roughly coeval with Grotta di Fumane, G. Laplace reported only one small point with marginal abrupt retouch, which represented 0.4 % of the bladelet tools (LAPLACE 1977). Another similarity between Krems and Grotta di Fumane is represented by the presence of Mediterranean seashells which are contemporary with the Aurignacian occupation.

All of this confirms the homogeneity of the industry at Krems-Hundssteig, which was already apparent on the basis of the typological analysis which revealed both the technical and typological coherence of the assemblage and the absence of forms which are particular to other complexes and especially the Gravettian. It also highlights the close relationship between Krems-Hundssteig and the Aurignacian industries with a large bladelet component which are distributed between Veneto and Catalonia, and its exceptional place in the context of the Aurignacian of Central Europe. The relationships with the Aurignacian industry from Fumane seem to be particularly close, even though there are marked differences in the environmental conditions and in the resources offered by the two sites.

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Fig. 1. Krems-Hundssteig lithic assemblage: points with abrupt retouch (1-11), bladelets with marginal abrupt retouch (12-18), truncated bladelets with abrupt retouch (19, 20), geometrics (21)

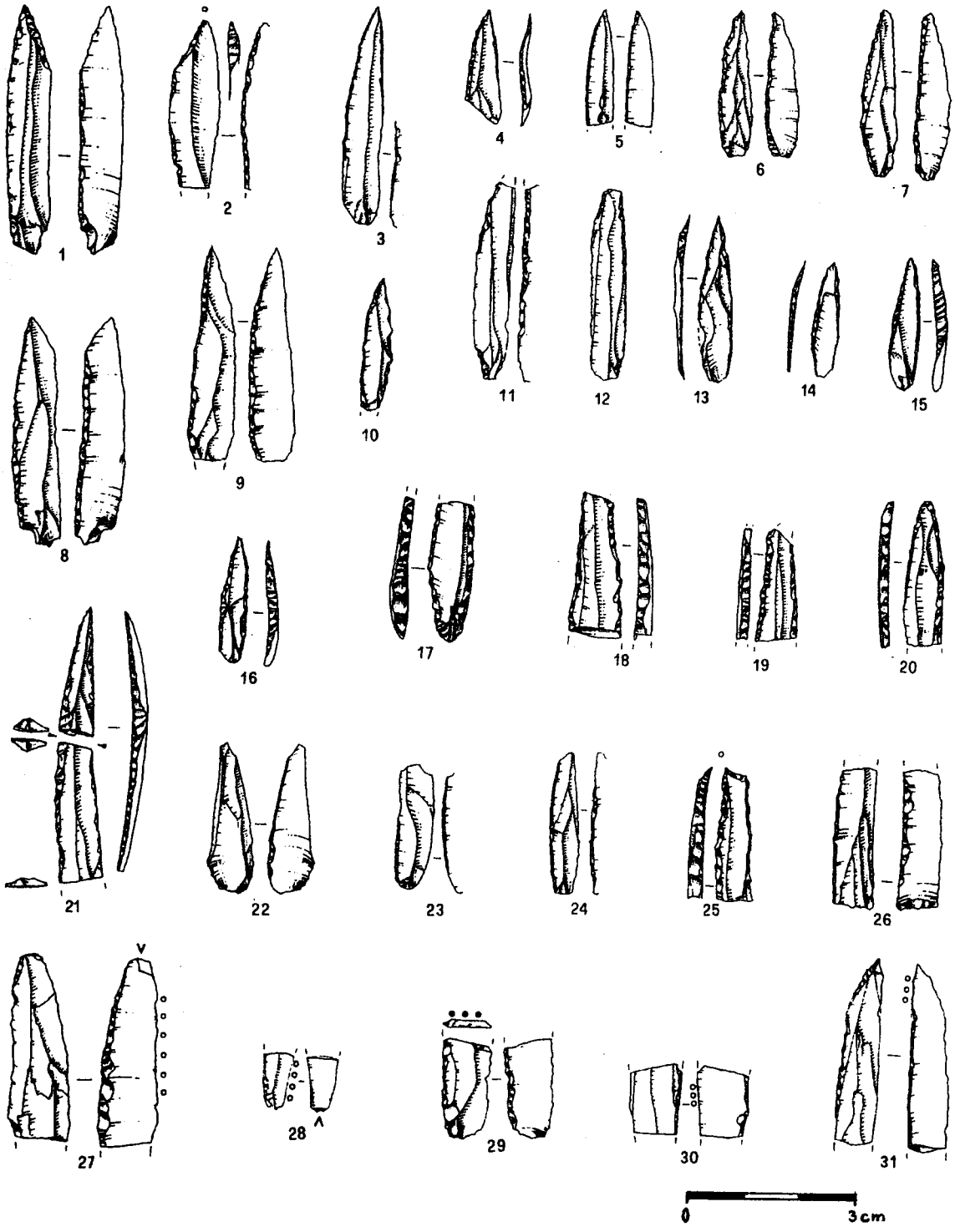

Fig. 2. Fumane lithic assemblage: truncation-points (1, 2), points with abrupt retouch (3-21), bladelets with marginal abrupt retouch (22-24), truncated bladelets with abupt retouch (25, 26), fragments of bladelets tools used as projectile weapons (27, 28), as cutting tools (30), for scraping or whittling (29), for grooving and cutting resistant matter (31)

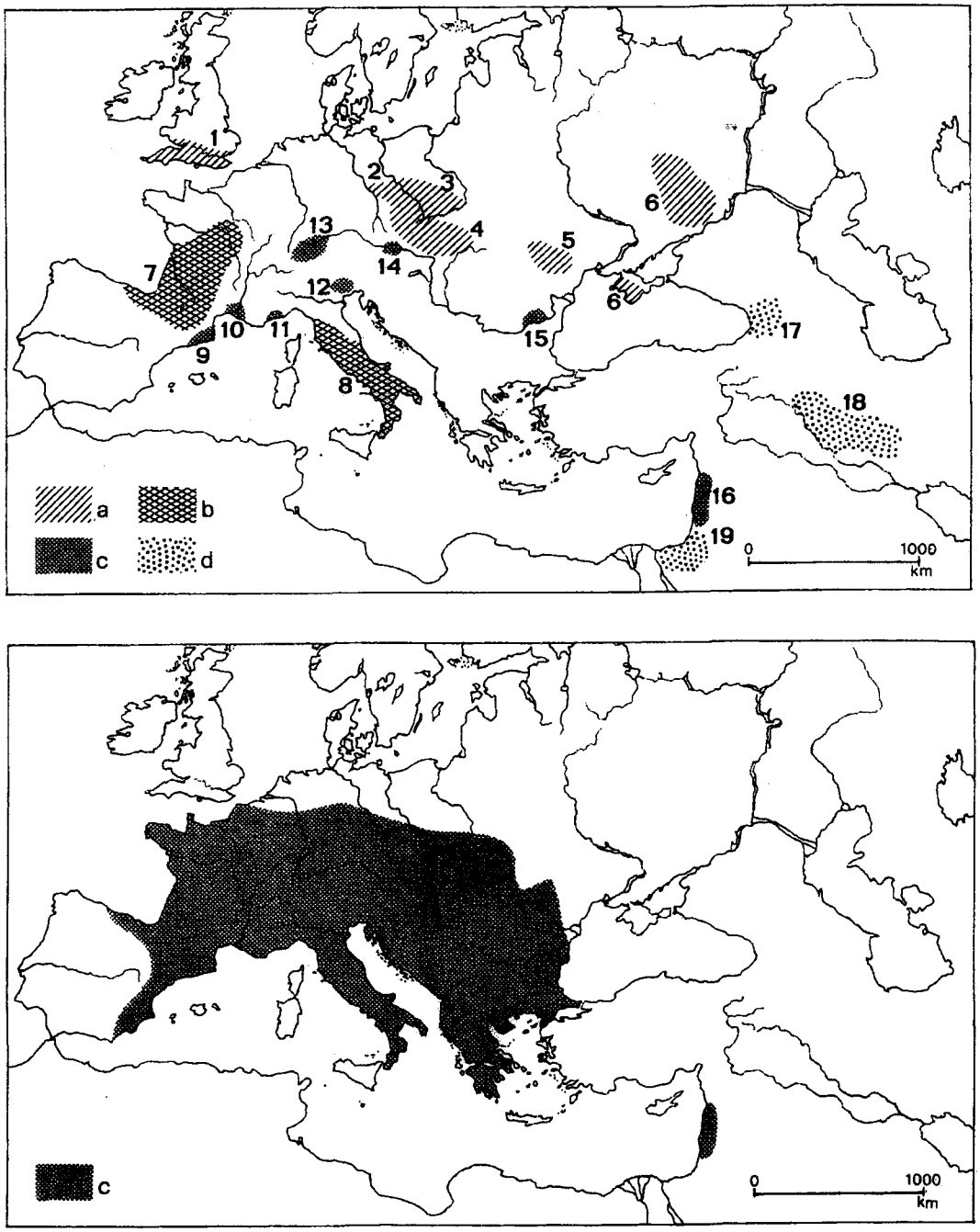

Fig. 3. *Above*: Cultural differences in Europe at the end of the Hengelo zone.
a - foliate point complexes (1 Lincombian, 2 Ranisian, 3 Jerzmanovician, 4 Szélétian, 5 Bryndzenian, 6 Streletskian); b - backed point complexes (7 Chatelperronian, 8 Uluzzian); c - Protoaurignacian complexes (9 Arbreda and other Catalan sites, 10 sites in the Gardon Gorge, 11 Riparo Mochi, 12 Grotta di Fumane and Grotta Paina, 13 caves in the Swabian Jura, 14 Willendorf and Krems-Hundssteig, 15 Bacho Kiro and Temnata, 16 sites in the Levant); d - other complexes (17 Early Upper Palaeolithic in Transcaucasia, 18 Baradostian, 19 Ahmarian).
Bottom: Diffusion of the Aurignacian in Europe and the Near East, at the end of the inter-Hengelo-Arcy zone.