Quaternary International xxx (2016) 1–7

Contents lists available at ScienceDirect

Quaternary International

journal homepage: www.elsevier.com/locate/quaint

# Humans confront the Last Glacial Maximum in Western Europe: Reflections on the Solutrean weaponry phenomenon in the broader contexts of technological change and cultural adaptation

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ARTICLE INFO

*Article history:*
Available online xxx

*Keywords:*
Bladelets (microblades)
Solutrean
Upper Paleolithic
SW Europe
Weapon systems

ABSTRACT

Lithic weapon tips have existed at least since the Middle Paleolithic. Beginning in the Early Upper Paleolithic of Europe, bladelet (a.k.a. microblade) elements used as edges, barbs or tips were added to the repertoire of weapon technology. Various forms thereof are present in Aurignacian, Gravettian, Solutrean and Magdalenian assemblages. In the Solutrean, they are found together with large stone points (foliate, shouldered, stemmed), presumably used on different kinds of weapons (thrusting spears, hand-thrown javelins, atl-atl darts and perhaps even bow-propelled arrows). These different kinds of weapon systems existed throughout the Upper Paleolithic under both stadial and interstadial conditions and, once invented (or re-invented) seem to have been variations on the same classes of projectiles whose functional distinctions remain to be identified. Nonetheless, in the Solutrean context during the Last Glacial Maximum (c. 25–20 cal ka), developments in weaponry (including the use of bladelets along with the better-known Solutrean points) were parts of a suite of adaptations to extreme environmental conditions ranging from territorial contraction into refugia in SW Europe to subsistence intensification.



## 1. *Plus ça change, plus c'est la même chose.* Cycles in the material culture of lethal technology

As its archeological name indicates, the Paleolithic was the stage in the development of human culture during which the key material basis of technology (and also the most important physical manifestation of cultural behavior) was stone. Until the time of the Schoeningen untipped wooden spears in eastern Germany and a few bone bifaces in Italy dating to the late Acheulean, stone was really the only known material culture for which we have clear, substantial evidence in the record. Little by little, during the Middle Paleolithic and Middle Stone Age, hints of the use of organic (and some other mineral) materials for the confection of artifacts (especially projectile points) begin to appear somewhat more frequently in the record (e.g., bone points in the MSA of southern and eastern Africa, perforated shells there and in the Mousterian of North Africa, Europe and the Levant, wooden artifacts at the Abric Romani in Catalonia, the mixing of ochre and plant materials for glue in the MSA, the use of bitumen in the Mousterian of the Near East). But the critical elements of material culture, especially involving food procurement were lithic. Hafting of large, single-element stone projectile points now seems very probable (or even certain) in the Middle Stone Age and Middle Paleolithic (and "Transitional Industries"), at least in certain regions of the Old World (e.g., Shea, 2006; Villa and Soriano, 2010). Such techno-complexes (archeo-cultures) as Stillbay, Howiesons Poort, Lupemban, Aterian and Doian in Africa, Levalloiso-Mousterian in the Near East, Lincombian, Szeletian *sensu lato*, Micoquian and Streletskayan in NW, Central and Eastern Europe are defined by the presence of a variety of large stone projectile points—some leaf-shaped, some minimally retouched, some concave-based, some even tanged. Some of these traditions were short-lived and geographically localized; others were more enduring and widespread. Some, like Stillbay, were surprisingly sophisticated and "modern" both in conception and in fabrication, in some cases at very early dates (even as much as ≥100 ka, but others much later). Differences between certain stone-projectile-rich MP/MSA industries and certain Upper Paleolithic/Later Stone Age ones are often rather elusive at least as concerns the stone "point" fractions of artifact assemblages. Thus, without reliable radiometric dates, considerable confusion can reign in the correct chrono-stratigraphic assignment

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http://dx.doi.org/10.1016/j.quaint.2016.01.059
1040-6182/

of particular assemblages or even industries, as was notoriously the situation with certain African MSA "cultures" often considered to be quite recent, indeed once regarded by some as equivalent in age to the European Upper Paleolithic on technological grounds (notably their projectile points) prior to the dating revolutions of recent years.

In the case of Europe, there seems to have been considerable continuity between the leaf-point industries of the Middle Paleolithic and the backed knife/point industry of the Mousterian of Acheulean Tradition on the one hand and those of the so-called Early Upper Paleolithic and Transitional Industries (e.g., Szeletian *sensu lato*, Châtelperronian, Uluzzian) on the other hand. Furthermore, the relationships between specific cultural complexes on the one hand and Neandertals and African-originated *Homo sapiens sapiens* on the other hand remain unclear. Both types of humans were no doubt capable of making all these kinds of weapons. Generations of archeologists have agonized over the question of morphological similarities among *Blattspitzen* industries that we now know in some cases to have been of very different ages (e.g., Freund, 1952; Kozłowski, 1990). How to disentangle the supposedly competing "explanations" of independent invention and diffusion (of ideas and/or objects) is a problem that has been debated fervently—and, in the case of the Solutrean culture of SW Europe, frequently taken to absurd extremes, particularly in the defense of highly improbable or impossible hyper-migrationist theories. Likewise the relationship between the leaf-point industries and the ("first true"?) Upper Paleolithic techno-complex—the Aurignacian—has been long and strenuously debated. And finally, can cause–effect relationships reasonably be seen between climatic phases (and hence adaptive challenges) and the (re-)invention of certain projectile point types?

The theses of this brief essay are that:

1.) the history of human technology during the course of the Paleolithic has been replete with cases of independent invention and hence morphological and functional convergence especially in the subset of lithic projectile points;
2.) there is a degree of cyclicality in the use of large stone points versus microblades attached to bone/antler/wood projectile elements; neither the Solutrean best known for its foliate and shouldered points nor the Magdalenian so often very rich in osseous *sagaies* and backed bladelets was unique as an industry in terms of its signature weapons and in neither "culture" were the respective weapon types exclusive;
3.) shifts in the regional/subcontinental popularity of one type of weapon system versus the other could sometimes correspond to (and perhaps be "caused" or triggered by) overall adaptive systems changes, in turn underlain by alterations in climatic and hence environmental regimen and subsistence resource structure; but
4.) it might not necessarily be true that one type of weapon system or the other was inherently "superior" to the other in the abstract, with both types often coexisting within the same "cultures".
5.) it is not necessarily the case that microblades are correlated with the extreme climatic conditions of the Last Glacial Maximum; they were made and used before, during and after this even by foraging peoples in Western Europe, although their relative frequencies (and specific types) varied both within and among specific climatic phases.

The goal of this brief contribution is to reflect on the Solutrean phenomenon after over 40 years of personal research and in the wake of a multitude of recent publications by specialists working in many new ways on this supposedly unusual culture in France, Spain and Portugal especially in three symposium volumes (SERAP Vallée de la Claise, 2013; Ripoll et al., 2014; Straus, 2015a,b), to shed light on the large point versus microblade weapon element question during the Last Glacial Maximum in SW Europe. Beyond its culture area in southern France and Iberia, the study of Solutrean killing technology against the backdrop of the climatic crisis has relevance throughout Eurasia and, slightly later, even North America, not to mention parallel developments in Africa. How unique the Solutrean really was and how specifically its weapons technology represented a direct adaptation to the extreme conditions of the Last Glacial Maximum are central questions that need to be addressed—if not definitively answered. I have long argued (e.g., Straus, 1990, 1993, 2000; see also papers in Peterkin et al., 1993; Knecht, 1997) that the most dynamic and diagnostic sector of Upper Paleolithic industries was weaponry, notably projectile points and elements. Throughout the Upper Paleolithic, hunters changed their habitual spear, javelin, dart (or even arrow), seemingly alternating between similar solutions across the millennia. Were the alternative technologies tied to specific environmental conditions (e.g., more temperate and wooded versus colder and more open)? Or were preferences for large, single-unit stone points versus composite osseous points-*cum*-microblade elements equivalent to neutral mutations? Was there deliberate, environmentally conditioned selection for one system or the other, or ("fad"-like) did societies shift over time from one to the other and back again as a matter of cultural drift?

## 2. The Aurignacian and Gravettian techno-complexes

In the European record, two seminal technological developments occurred more or less simultaneously and with widespread distribution in the early (and "proto-) "Aurignacian" (*sensu lato*), apparently before the appearance of representational art: standardized (split-base, rhomboidal and massive-base) osseous points and "true" (deliberate) lithic bladelets (microblades) (see Kuhn, 2002; Bon, 2002; Teyssandier et al., 2010; papers in Bar-Yosef and Zilhão, 2006, for recent reviews). Both of these classes of artifacts were certainly or probably weapon elements. Their mode(s) of propulsion is (are) unknown, although there is no strong evidence for the existence of atlatl or bow-and-arrow at this time in Europe. Major foci of the different Aurignacian lithic knapping strategies were the production of bladelets, including a variety of "Dufour" (edge-nibbled) ones. Indeed, many so-called nosed and keeled Aurignacian "endscrapers" were in fact bladelet cores (see papers in LeBrun-Ricalens, 2005). There is considerable variability among assemblages in terms of the abundance of both bone/antler points and Dufour bladelets, and it is no longer viable to see this as reflective of different universal phases of the so-called Aurignacian tradition hafted, there is meaningful microwear evidence that they were not used as weapon elements. Thus, from the beginning of the full-blown ("true") Upper Paleolithic there seem to have been two parallel weapon-tipping systems: 1.) large, simple and stone versus 2.) small, complex and probably multi-material (stone + fixatives + wood/antler/bone).

The various Aurignacian industries developed under variable, but generally interstadial environmental conditions of late MIS 3, between ca. 45–30 ka, punctuated by a particularly cold episode (inter-Hengelo-Denekamp) near the end of this stage (see van Andel and Davies, 2003). The run-up to the MP–UP transition had been a time of particular climatic instability, but overall the human range in Europe was very broad and extended well into the northern latitudes. The popularity of the characteristically "Aurignacian" osseous points and of nibbled bladelets (Dufour *sensu lato* and Krems types) was surprisingly widespread, suggesting the existence of effective, continuous networks of social relationships

Please cite this article in press as: Straus, L.G., Humans confront the Last Glacial Maximum in Western Europe: Reflections on the Solutrean weaponry phenomenon in the broader contexts of technological change and cultural adaptation, Quaternary International (2016), http://dx.doi.org/10.1016/j.quaint.2016.01.059