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# The Lower/Middle Palaeolithic transition - is there a Lower/Middle Palaeolithic transition?

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SUMMARY - *The Lower/Middle Palaeolithic transition - is there a Lower/Middle Palaeolithic transition?* - The terms "Lower" and "Middle" Palaeolithic have been questioned in the actual archaeological discussion, as the border between the "Middle" and the "Upper" Palaeolithic can be seen not only as an invention of new stone and bone working techniques, of "arts", but also as a change, at least in Europe, in the sense of physical anthropology (from *Homo neanderthalensis* to *Homo sapiens*). Comparing the Central and Western European stone artefacts from Middle and Early Upper Pleistocene including the "waste" – remains of tool production –, it can be shown that there were a gradual development in flaking technology from general more clumsy to flatter and from dorsally less to more elaborated pieces allowing the use of sharper edges and a higher productivity of the raw material. Three steps of this technological development can be distinguished in Central Europe synchronized with Pre-Saalian interglacials (Holsteinian and Dömnitz), the Saalian glacial complex *sensu stricto*, and the Early Upper Pleistocene with the Eemian and the Lower Weichselian periods. As the changes between these techno-complexes are quite less intensive than the Middle-Upper Palaeolithic transition ones, it may be useful to term them as "Early", "Middle", and "Late" Lower Palaeolithic.

RIASSUNTO - *La transizione tra Paleolitico inferiore e medio - esiste una transizione tra Paleolitico inferiore e medio* - I termini Paleolitico "inferiore" e "medio" sono stati discussi nell'attuale dibattito archeologico, dal momento che il confine tra Paleolitico "medio" e "superiore" può essere visto non solo come il momento dell'invenzione di nuove tecniche per la lavorazione della pietra e dell'osso, di "arti", ma anche come un cambiamento, almeno in Europa, nel senso dell'antropologia fisica (dall'*Homo neanderthalensis* all'*Homo sapiens*). Confrontando i manufatti dell'Europa centrale e occidentale del medio e primo Pleistocene superiore includendo gli "scarti" – resti della produzione di strumenti –, si può notare come ci sia stato un graduale sviluppo nella tecnologia flaking, che ha portato i pezzi ad essere in generale da ruvidi a più lisci e da poco a più elaborati, cosa che testimonia l'uso di taglienti e un maggiore sfruttamento del materiale grezzo. Si possono distinguere tre passi di questo sviluppo tecnologico nell'Europa centrale, sincronizzati con gli interglaciali Pre-Saaliani (Holsteiniano e Dömnitz), il complesso glaciale Saaliano *sensu stricto*, e il primo Pleistocene superiore con i periodi Eemiano e Basso Weichseliano. Poiché i cambiamenti tra questi tecno-complessi sono a dir poco meno intensi di quelli della transizione tra Paleolitico medio e superiore, potrebbe essere utile definirli come "primo", "medio" e "tardo" Paleolitico.

*Key words:* Lower Palaeolithic, Middle Palaeolithic, transition, lithic technology
*Parole chiave:* Paleolitico inferiore, Paleolitico medio, transizione, tecnologia litica

## 1. INTRODUCTION

In her paper published in 2006 Gilliane F. Monnier discussed the terms "Lower" and "Middle Paleolithic". She analyzed 89 West European lithic inventories dated independently from typological methods with regard to their tool (and Levalloius flake) composition and found that these data do not allow a clear separation between a "Lower" and a "Middle" Palaeolithic toolkit comparable to the dramatic change from the Middle to the Upper Palaeolithic. Monnier proposes a forthcoming analysis giving "a *behaviorally* meaningful periodization of the archaeological record […] including climate, subsistence, landscape use, mobility and exchange, cognition, and biological evolution".

Although we have – compared with the archaeologists of the 19th century – much more evidence for some of these fields at least on a Pan-European level (e.g. the Heidelberg mandible, the bone engravings from Bilzingsleben, the wooden spears from Schöningen), it would be very difficult to collect all these data for all the sites mentioned in Monnier's text. Some of the parameters (of a very general kind like "cold" and "warm" climates) have already been included in Monnier's work. Here I propose to include another source of information about Palaeolithic people: stone artefact (preferably flake) technology.

## 2. STUDY AREA

In Central Germany, and several parts of Eastern Europe, a large number of some 60 inventories coming from more than 40 sites have been analyzed technologically by D. Schäfer & Th. Weber during the last 30 years. Since 1989, it has been possible to include material from Western Germany, Western Europe and South Africa. The German finds can be dated in the time span from the Middle

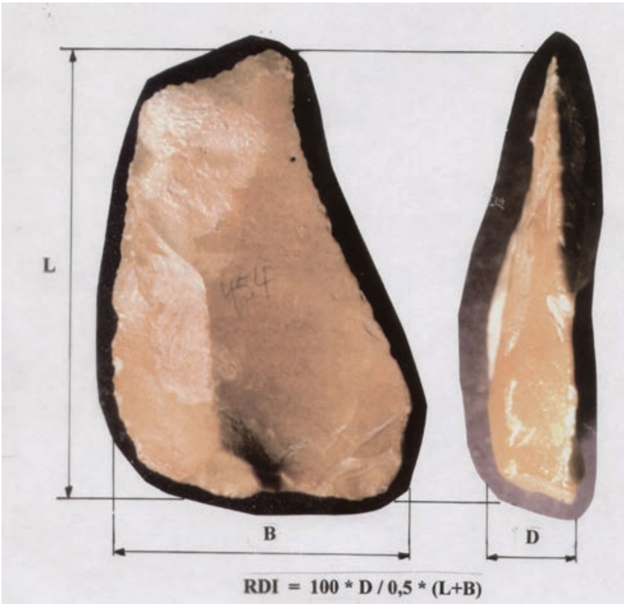



Fig. 1 - R(elative) T(hickness) I(ndex): the relation between the thickness and the mean of the length and the breadth of the flake (measured in flaking direction resp. rectangular to it).


Fig. 2 - Flaking angle of a flake: between (rest of) striking platform and (the proximal part of) ventral face.

Pleistocene (Pre-Saalian) interglacials (including Holsteinian), perhaps 300,000 years ago, to the Early Weichselian interstadials (like Odderade), some 60,000 years ago. The European assemblages are partly older (Vértesszöllös: "Inter-Mindel") and the South African artefacts are sometimes more than 1,000,000 years old.

## 3. METHOD

Our attempt is based on the observation that stone flakes in most of the inventories are the most numerous artefact category with dozens or hundreds (or sometimes thousands) of pieces. They originate in different processes:

- from raw material procurement
- through blank production
- up to tool modification and resharpening.

*In praxi* we found that (in spite of these different steps) the flakes show different features that are more dependent on the chronological, "techno-historical" position than on the different functional requirements of the inventories.

These flakes should be investigated analytically: several describable features can be compared from inventory to inventory.

Absolute measurements of the flakes (length measured in flaking direction, breadth and thickness rectangular to it) are dependent from

- the raw material size
- the function of the pieces in the production process
- the excavation/collection strategy.

There are form quotients like L(ength) B(readth) I(ndex), length measured in flaking direction, breadth and thickness rectangular to it, R(elative) T(hickness) I(ndex) (Fig. 1) and W(idth) D(epth) I(ndex) of the striking platform more or less independent from these three factors. Compared with a "volumetric" definition of the Levallois technique (van Peer 1992), the RTI can be seen as an expression of the "Levallois frequency".

The condition of the striking platform reflects its preparation, the flaking angle (Fig. 2) the striking manner.

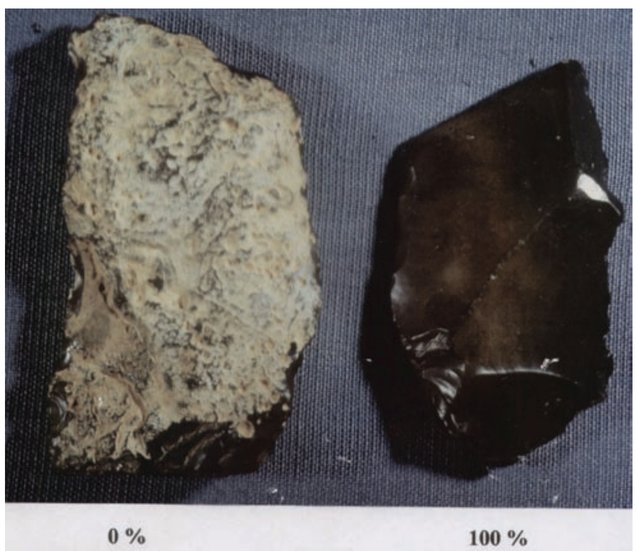
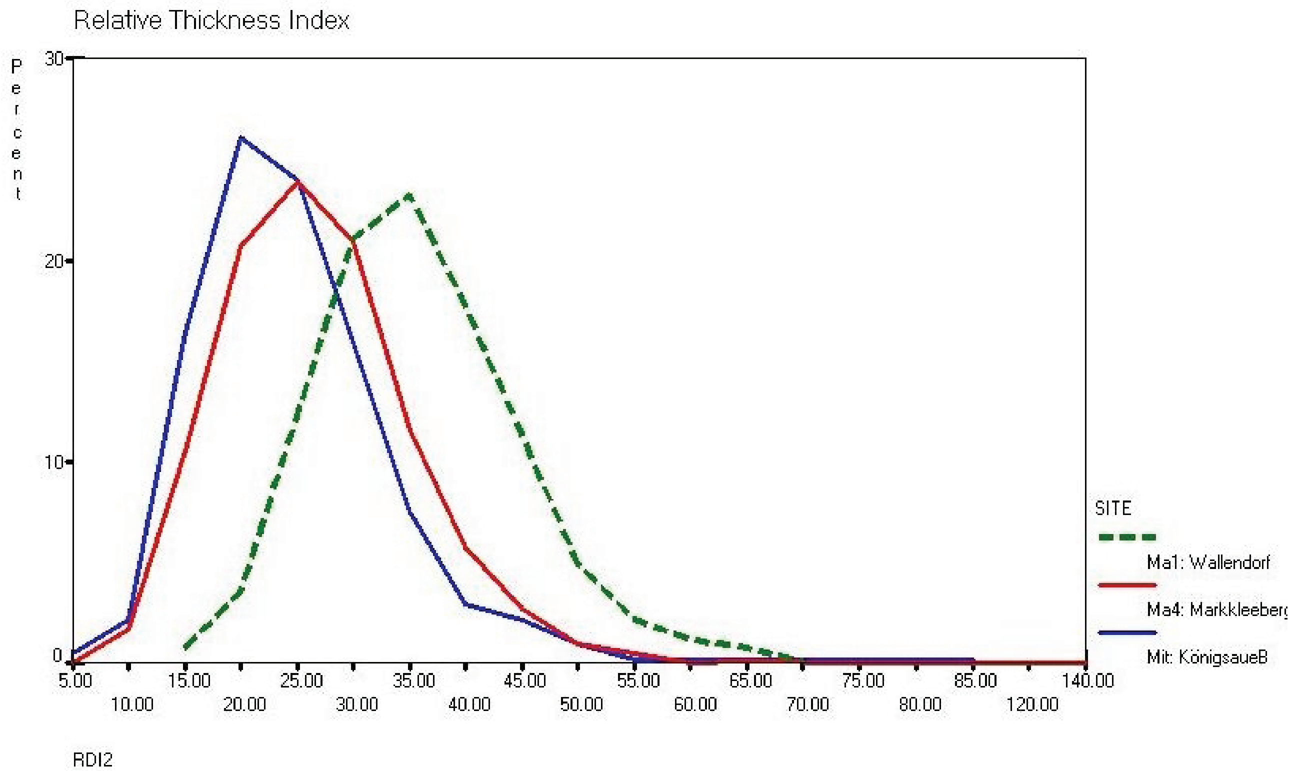



*Fig. 3 - Percentage of dorsal worked surface. Portion of dorsal face covered by (older) flake scars (estimated at a 10% level).*

a.

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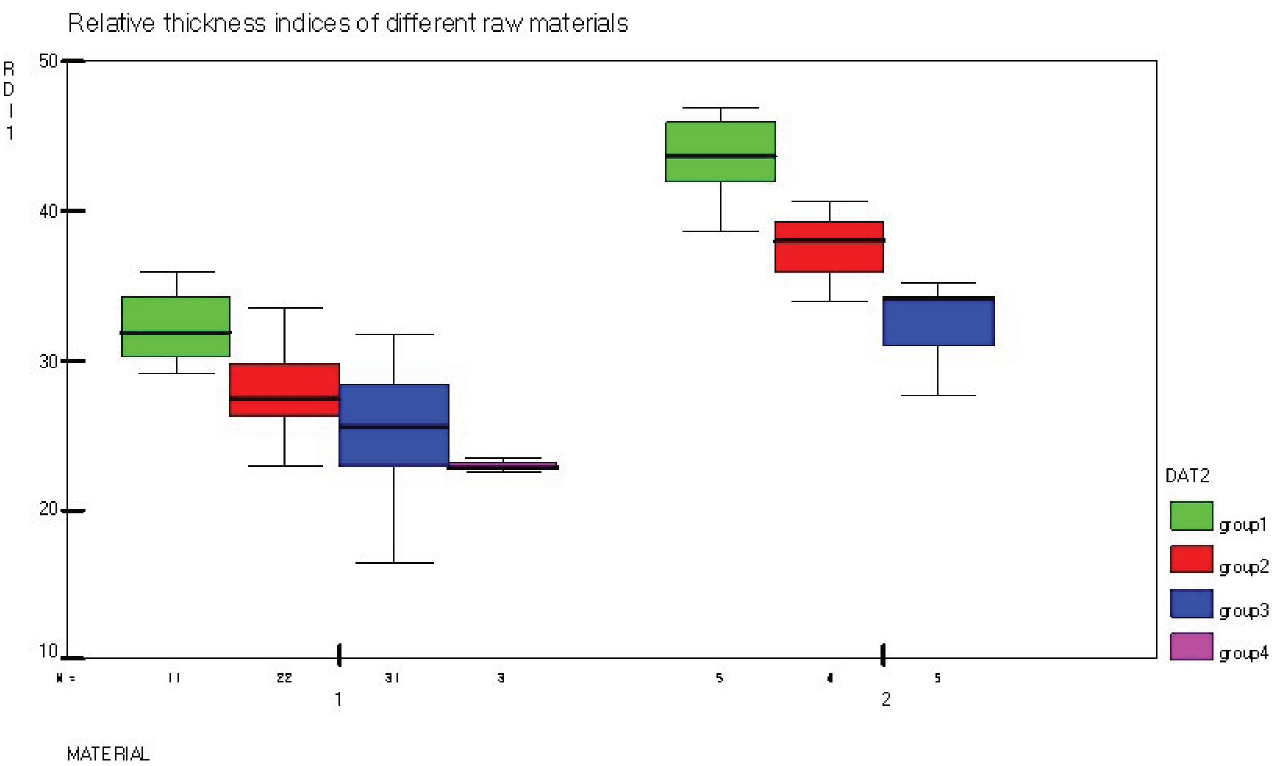
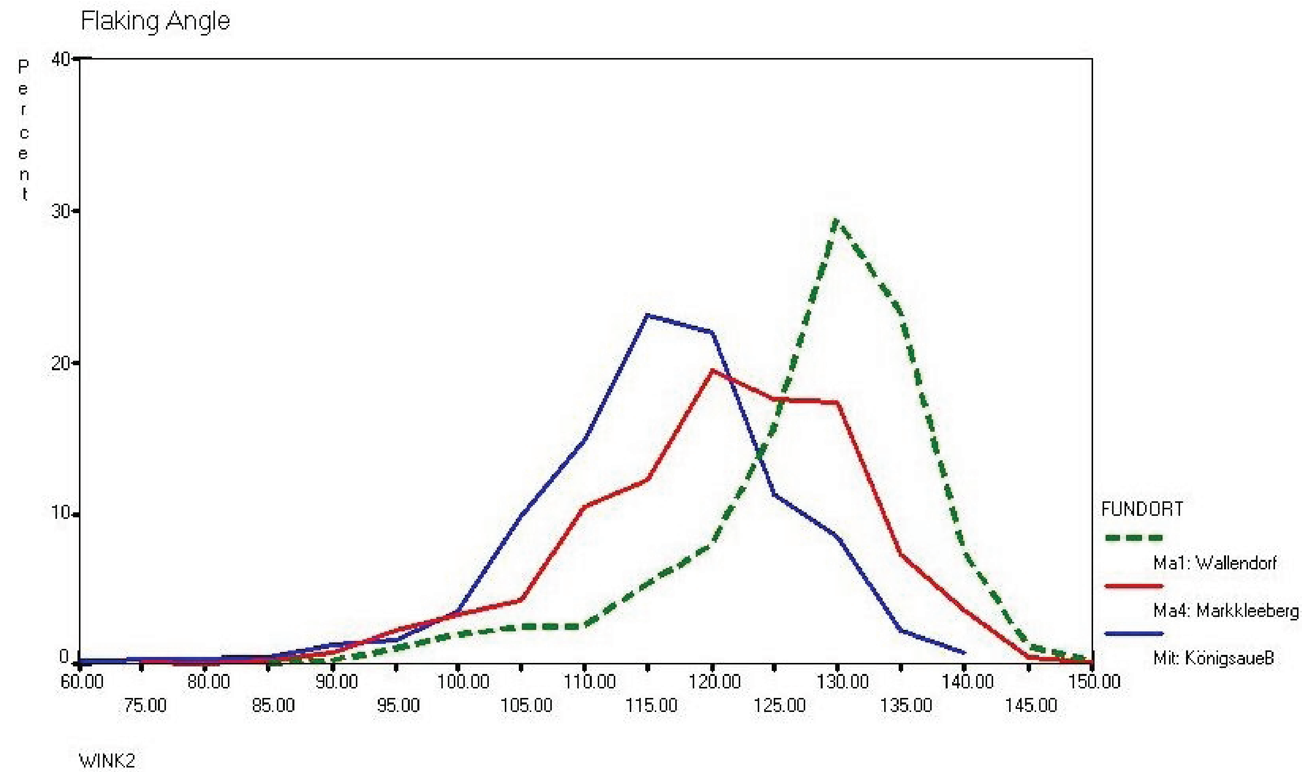



Fig. 4 - a. Relative thickness index distributions of the complete flakes from the Wallendorf (green), Markkleeberg (red) and Königsaue B flake inventories (blue). b. Boxplot diagram showing median (-), quartiles (☐), distributions except outliers and extremes (I), outliers (o), and extremes (*) for the distributions of the arithmetic means of the Relative thickness index measurements in "Clactonoid" (green), "Acheuloid" (red), Early (blue) and Middle Upper Pleistocene flake inventories (violet).

a.




b.

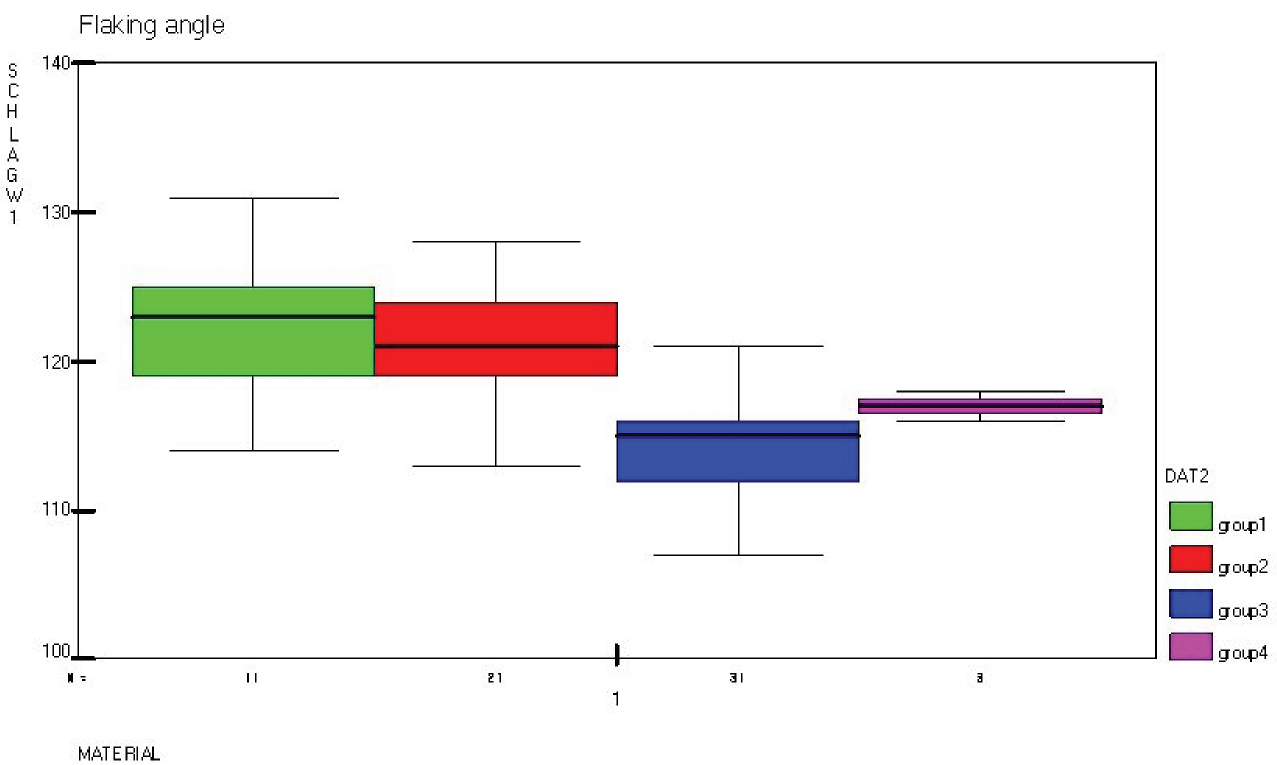



Fig. 5 - a. Flaking angle distributions of the complete flakes from the the Wallendorf (green), Markkleeberg (red) and Königsaue B flake inventories (blue). b. Boxplot diagram showing median (-), quartiles (☐), distributions except outliers and extremes (I), outliers (o), and extremes (*) for the distributions of the arithmetic means of the Flaking angle measurements in “Clactonoid” (green), “Acheuloid” (red), Early (blue) and Middle Upper Pleistocene flake inventories (violet).

The percentage of dorsal worked surface (Fig. 3) depends on the degree of core elaboration before the given flake was beaten, the dorsal reduction frequency on the preparation immediately on the platform edge.

## 4. RESULTS AND DISCUSSION

### 4.1. *Relative Thickness Index* (Fig.4)

The three Central German inventories, Wallendorf (Pre-/Early-Saalian gravel: green), Markkleeberg (Early Saalian "Mean terrace": red) and Königsaue B (Early Weichselian: blue) (Fig. 4a), show, in the chronological order, decreasing RTI values with a larger difference between the Wallendorf curve on one hand and the both later inventories on the other. Although there are broad zones of overlapping for the single pieces, the differences between the distributions are statistically significant[1].

The other inventories (Fig. 4b) from the Pre-/Early-Saalian (boxplot green), Saalian *sensu stricto* (red), Earlier Upper Pleistocene (Eemian & Early Weichselian: blue), and Middle Weichselian contexts (violet) show decreasing means for both raw material groups: cryptocrystalline (left) and (more or less fine) grained (right). Generally, the finer-grained cryptocrystalline pieces are flatter than the coarse-grained artefacts which cannot be flaked in such an elaborated technique. The relations between the different techno-complexes, however, can be observed in the same manner for both raw material groups (Schäfer 1979).

### 4.2. *Flaking angle* (Fig. 5)

The three Central German inventories show decreasing flaking angles with comparable differences between the three curves (Fig. 5a). Perhaps this is, under the circumstances of generally comparable raw material, a result of different flaking techniques using possibly different percuteur materials: harder stones seem to produce other flaking angle distributions than softer ones (Thum & Weber 1987, 1991).

The other inventories (Fig. 5b) from the Pre-/Early Saalian, Saalian (sensu stricto), Earlier Upper Pleistocene (Eemian & Early Weichselian) and Middle Weichselian contexts show decreasing means especially from the second to the third group and from the third to the fourth even a small increase.

### 4.3. *Worked dorsal surface* (Fig. 6)

Wallendorf, Markkleeberg and Königsaue B show distinct curves especially with the different relative frequencies of pieces with total worked dorsal surface increasing from 10% in Wallendorf through 25 in Markkleeberg up to more than 80% in Königsaue (Fig. 6a).

The inventories from the Pre-/Early Saalian, Saalian sensu stricto, Earlier Upper Pleistocene (Eemian & Early Weichselian) and Middle Weichselian contexts show increasing means especially from the second to the third and fourth group (Fig. 6b).

### 4.4. *Multidimensional scaling*

A multivariate technique includes the variables
- length-breadth index (arithmetic mean)
- relative thickness index (arithmetic mean)
- width-depth index of striking platform (arithmetic mean)
- relative frequency of primary platform
- relative frequency of facetted platform
- flaking angle (arithmetic mean)
- worked dorsal surface (arithmetic mean)

showing them together in a two-dimensional diagram.

In figure 7, including the inventories of at least 50 measurable pieces, we can generally observe a gradual development from the left lower to the right upper part of the diagram, with relatively broad zones of overlapping. The most "primitive" pieces come from the two experimental flake inventories elaborated by J. Thum with flint (fli) and sandstone hammerstones (san), which are labelled here as "group 1", like Vértesszöllös, Bilzingsleben, Clacton-on-Sea and Wallendorf.. In the second group we find Markkleeberg and Hoxne, characteristic Acheulian assemblages. The both Rheindahlen inventories (R. B1 & B3 – r1 & r3) are situated in the third cluster not esteemed the discussion about an earlier dating especially of Rheindahlen B3 (Schirmer 2002). The Salzgitter-Lebenstedt (sz) inventory, here assigned to group 2, should clearly be included in group 3 on the basis of different, not only morphometrical arguments. All the three Ilm valley inventories, Weimar (w1), Taubach (t1) and Ehringsdorf (e1), form an small triangle of quite similar inventories in the third cluster not far from some of the "typologically evolved" Acheulian assemblages (Bertingen, Eythra, Heyrothsberge). From the technological point of view it is difficult to argue for a (compared with Taubach and Weimar pieces dated in the Eemian) separate-older-chronological position of the Ehringsdorf artefacts. The three Bulgarian assemblages coming from the Middle Weichselian layers in the Samuilitsa cave (sa1, sa2, sa3; group 4) show no difference to the Early Upper Pleistocene pieces from group 3. Generally the flake (and even the raw material) size do not determine the positions of the inventories in the diagram, what can be seen at the neighbourhoods between Vértesszöllös and Wallendorf resp. Königsaue B and Oppurg-Gamsenberg.

## 5. CONCLUSIONS

As the three Central German inventories– and even the results of the comparison of the three/four chronological groups from the viewpoint of stone artefact technology (flake production) – show, a clear break between a "Lower" and a "Middle" Palaeolithic level of lithic technology cannot be established. Therefore, it seems to be useful to evaluate the changes between at least the first three groups on the same level, as an "Earlier", "Middle" and "Late" Lower Palaeolithic.

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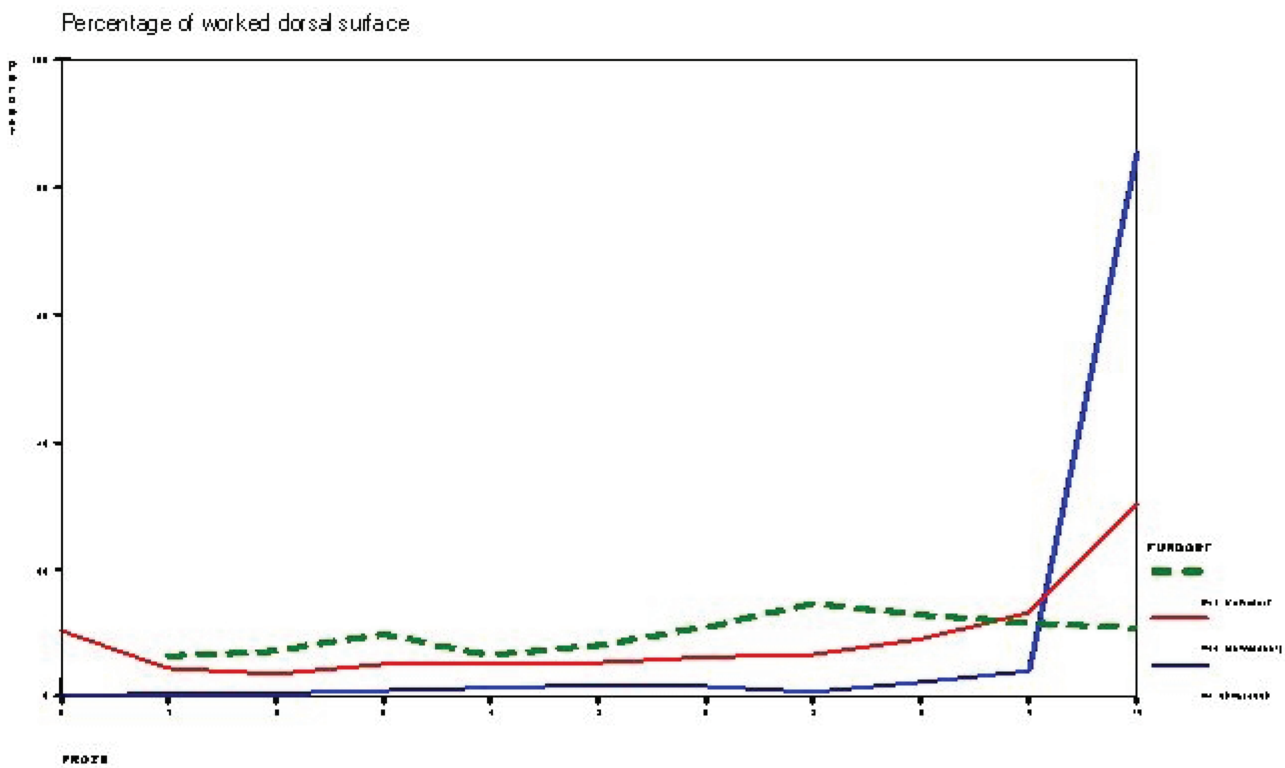
1 A Kruskal-Wallis-(H-)test shows for the relative thickness values mean ranks of 1396.35 (Königsaue B), 1695.35 (Markkleeberg) and 2693.92 (Wallendorf). These differences are highly significant ($X^2 = 521.5$).

a.

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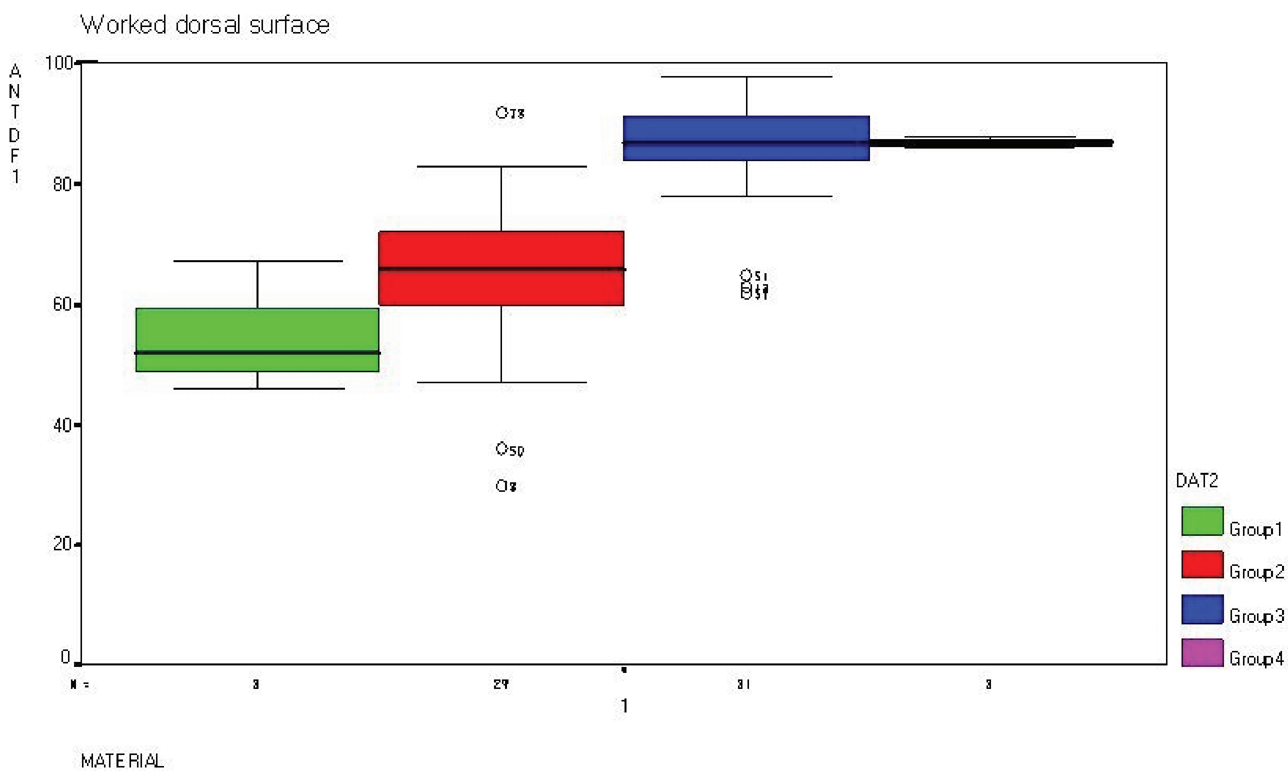


Fig. 6 - a. Dorsal working surface distributions of the complete flakes from the Wallendorf (green), Markkleeberg (red) and Königsaue B flake inventories (blue). b. Boxplot diagram showing median (-), quartiles (□), distributions except outliers and extremes (I), outliers (o), and extremes (*) for the distributions of the arithmetic means of the dorsal worked surface portions in “Clactonoid” (green), “Acheuloid” (red), Early (blue) and Middle Upper Pleistocene flake inventories (violet).

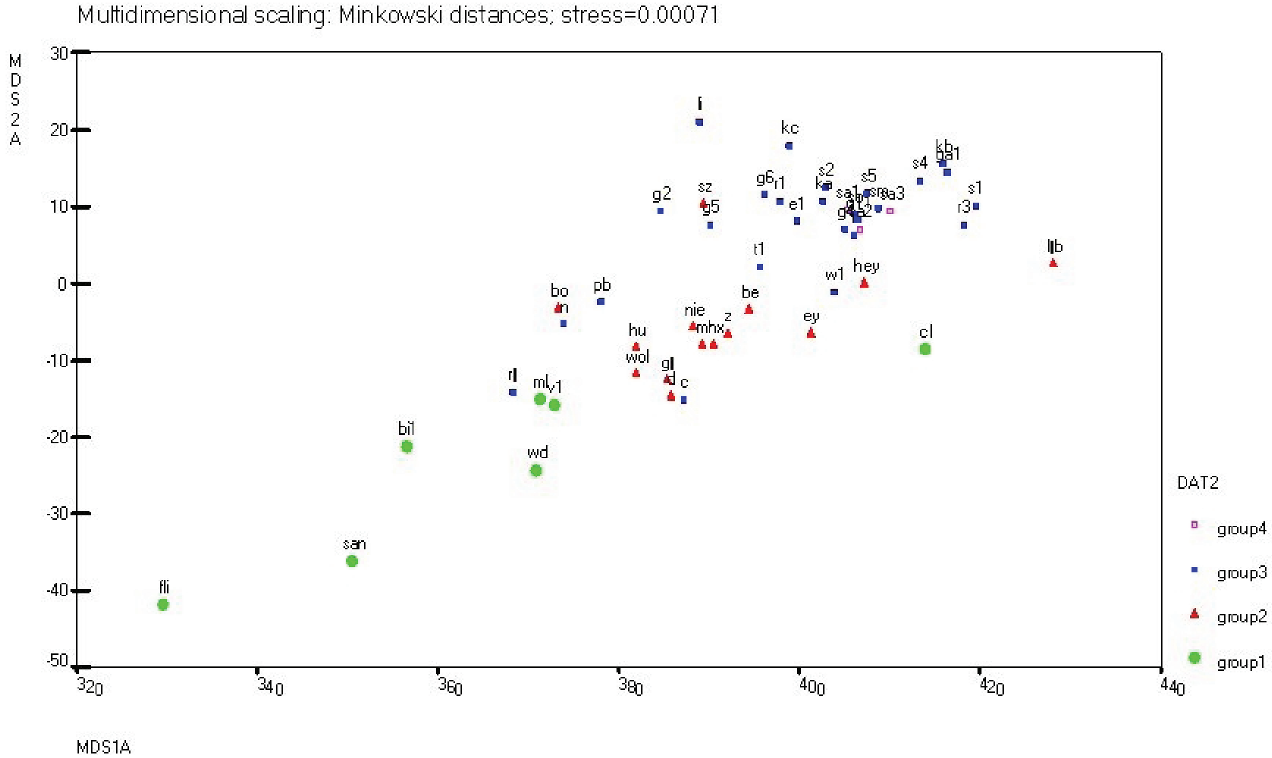


Fig. 7 - Multidimensional scaling of mean length-breadth index values, mean relative thickness indices, mean width-depth indices of striking platforms, relative frequencies of primary and of facetted platforms, mean flaking angles, and mean worked dorsal surface portions. Abbreviations for the sites: be= Bertingen; bi1= Bilzingsleben (flint); bo= bottrop; c= Cospuden; cl= Clacton-on-Sea; d= Delitzsch-Südwest; e1= Weimar-Ehringsdorf (flint); ey= Eythra; fli= experimental series (flint percuteur); ga1= Oppurg-Gamsenberg (flint); gue= Gübs; g2, g4, g5, g6, g11= Große Grotte 2, 4, 5, 6, 11; hey= Heyrothsberge; hu= Hundisburg; hx= Hoxne; ka, kb, kc= Königsaue A, B. C; li= Lichtenberg; lue= Lübbow; m= Markkleeberg; ml= Memleben; n= Neumark-Nord; nie= Niegripp; pb= Petersberg; r= Rabutz; r1, r3= Rheindahlen B1, B3; roe= Rösa; sm, s1, s2, s4, s5= Sesselfelsgrotte M1, G1, G2, G4, G5; sa1, sa2, sa3= Samuilitsa I, II, III (group 4; from left to right in the diagram); san= experimental series (sandstone percuteur); sz= Salzgitter-Lebenstedt; t1= Taubach (flint); v1= Vértesszöllös (flint); w1= Weimar (flint); wd= Wallendorf; wo= Woltersdorf; z= Zwochau (after Thum & Weber 1987, 1991; Schäfer 1993; Schäfer & Zöller 1996; Schäfer 1997; Weber 1997; Steguweit 1998; Weber 2007).

## 6. FURTHER RESEARCH

It seems to be useful to investigate other materials with the same description method, as D. Schäfer has done with South African finds which show a comparable trend in lithic technology, perhaps several hundreds of millennia earlier. In La Cotte de St. Brelade P. Callow *et al*. (1986) have measured the flakes from the different layers and we can find chronologically, from the lower to the upper layers, decreasing RTI values (if we calculate them by the mean absolute measurement values given in the publication, not as means of the single relative thickness indices).

Therefore, the comparison with other geological or chronostratigaphical "key sites", like e.g. Olduvai, Dmanisi or Schöningen, seen under the viewpoint of attribute analysis, may bring us to unexpected new arguments for the earliest technological and even behavioural history of mankind.

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