Università degli Studi di Ferrara

Marco Peresani

Cronologie e culture del Paleolitico
Lezione 6 – The Early - Middle Palaeolithic in Europe

Università di Ferrara
Dipartimento di Studi Umanistici
Sezione di Scienze Preistoriche e Antropologiche

The origins of the use and control of fire is one of the central and most debated topics in Paleolithic archaeology and human evolution

Fire use and control would have provided several crucial advantages to early humans: it can serve as a light and heating source, as a hunting aid, can be used for cleaning occupation surfaces, as protection from predators, as a means to improve tool technology, and as a way to increase food range, its nutritional value, and preservation

Natural fire: can be caused by lightning strikes, volcanic activity, sparks from rock falls, spontaneous combustion, and meteorite impacts.

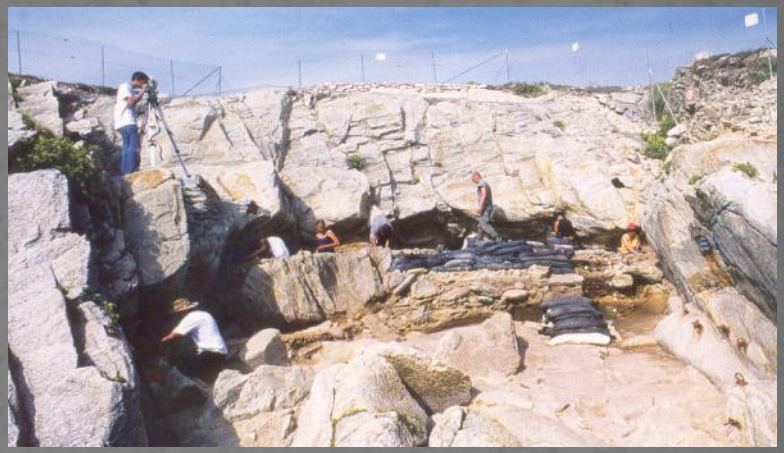
Human use of fire: human use or opportunistic use of fire is difficult to identify in the archaeological record. Some of the earliest evidence for knowledge of fire comes from the ca. 1.0 Ma site of Wonderwerk cave in South Africa (ash remains and burnt bone).

Human control of fire: control of fire or predetermined use means the maintenance of a fire via fuel provisioning and restraint. It includes preservation and transport of fire from natural sources of ignition and represents a much more complex and unique human behavior.

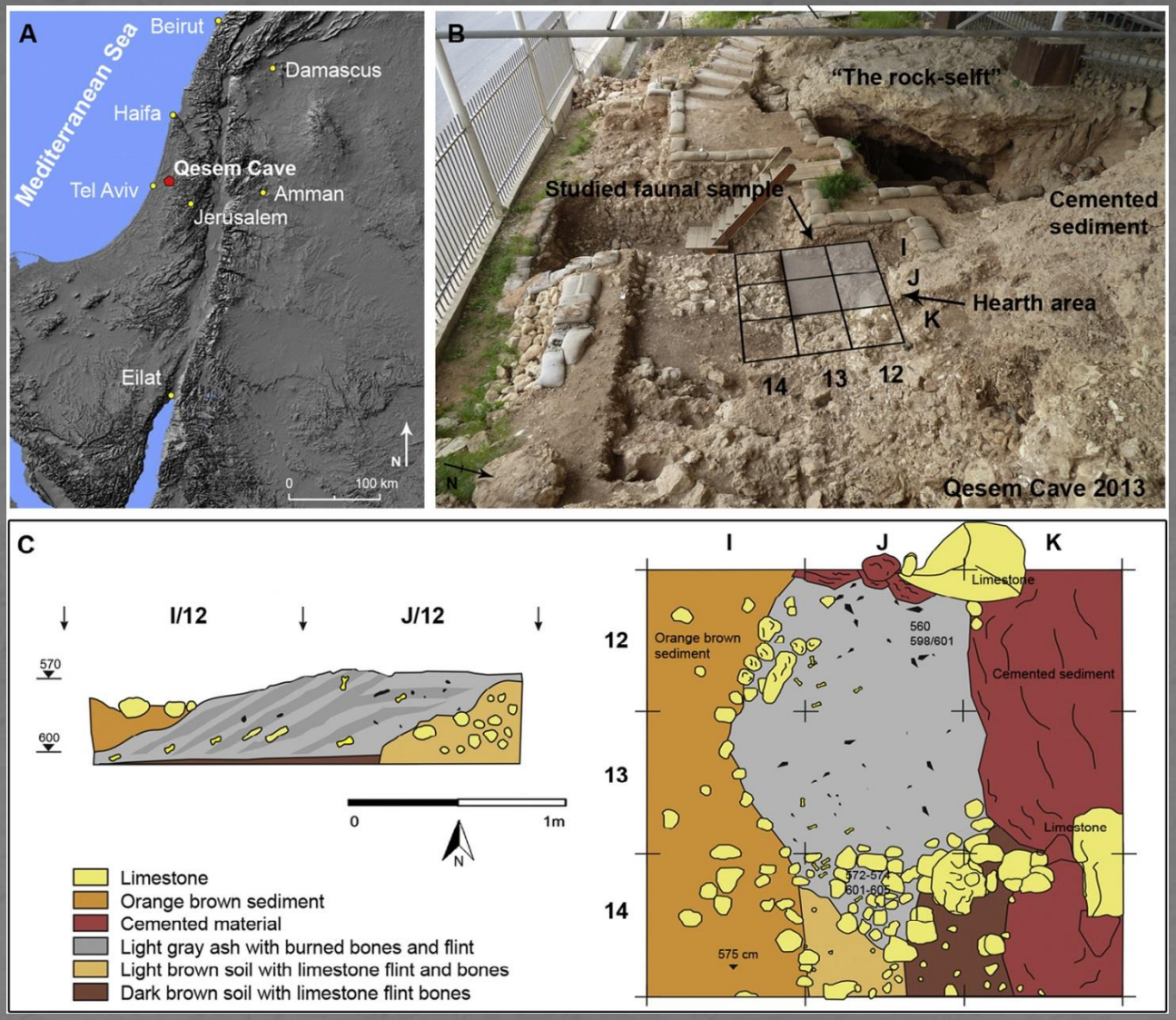
Combustion features, in the form of structured hearths, provide the most direct evidence for human control of fire; however, they can be difficult to identify since they are often ephemeral features subject to post-depositional alteration.

Earliest evidence of fire in europe

Menez-Dregan (Bretagna) ca. 0.5



Terra Amata (Francia) (ca. 400.000)


A
Mediterranean Sea
Beirut
Damascus
Haifa
Qesem Cave
Tel Aviv
Amman
Jerusalem
Eilat
N
0
100 km
B
"The rock-selft"
Studied faunal sample
Cemented sediment
I
J
K
Hearth area
14
13
12
N
Qesem Cave 2013
C
I/12
J/12
570
600
0
1m
N
Limestone
Orange brown sediment
Cemented material
Light gray ash with burned bones and flint
Light brown soil with limestone flint and bones
Dark brown soil with limestone flint bones
I
J
K
12
13
14
Limestone
Orange brown sediment
560
598/601
Cemented sediment
Limestone
575 cm

Qesem Cave

www.palethnologie.org

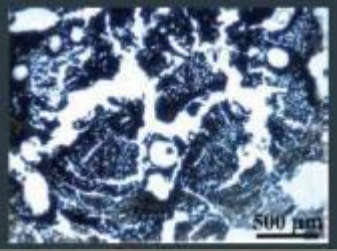
Revue bilingue de Préhistoire

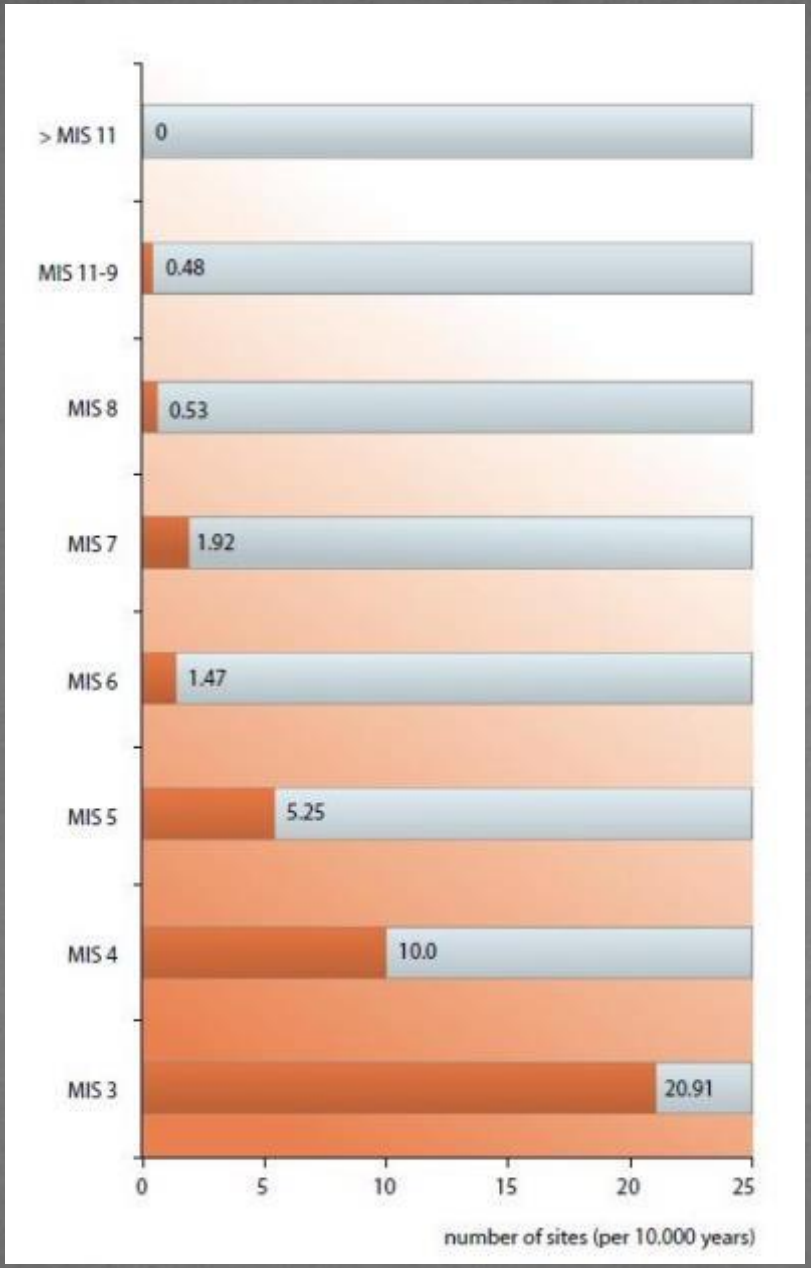
Taphonomie de la combustion des résidus organiques et des structures de combustion en contexte archéologique

sous la direction

Isabelle Théry-Parisot, Lucie Chabal & Sandrine Costamagno

Actes de la table ronde, 27-29 mai 2008, CEPAM





Number of sites in Europe with good evidence of fire per 10 ky.

Table S1. Age estimates of various MIS stages

MIS Boundary	LR04 Age, ka
1/2	14
2/3	29
3/4	57
4/5	71
5.a (peak)	82
5.b (peak)	87
5.c (peak)	96
5.d (peak)	109
5.e (peak)	123
5/6	130
6/7	191
7/8	243
8/9	300
9/10	337
10/11	374
11/12	424
12/13	478
13/14	533
14/15	563
15/16	621
16/17	676
17/18	712
18/19	761
19/20	790
20/21	814

Estimated age of MIS boundaries for the Middle and Late Pleistocene, based on the LR04 Stack record (1). For the substages of MIS 5, the ages of the isotopic peaks are indicated.

Human production of fire: Fire can be artificially produced by wood-on-wood friction or stone-on-stone percussion in addition to a tinder source. Direct evidence for this behavior is rare and so far has only been reported from the Upper Paleolithic, with one possible exception from the Middle Paleolithic site of Bettencourt, France.

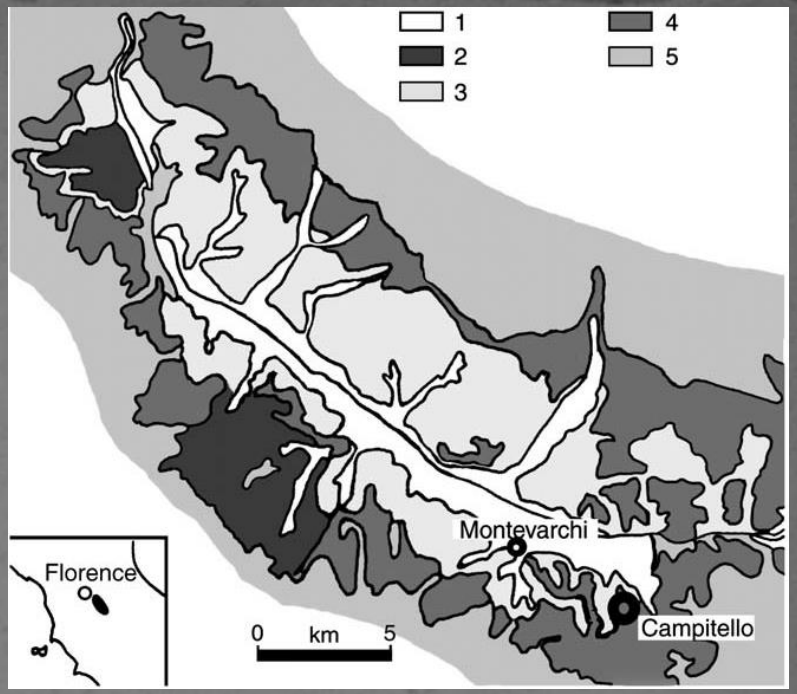
SCIENTIFIC REPORTS

OPEN

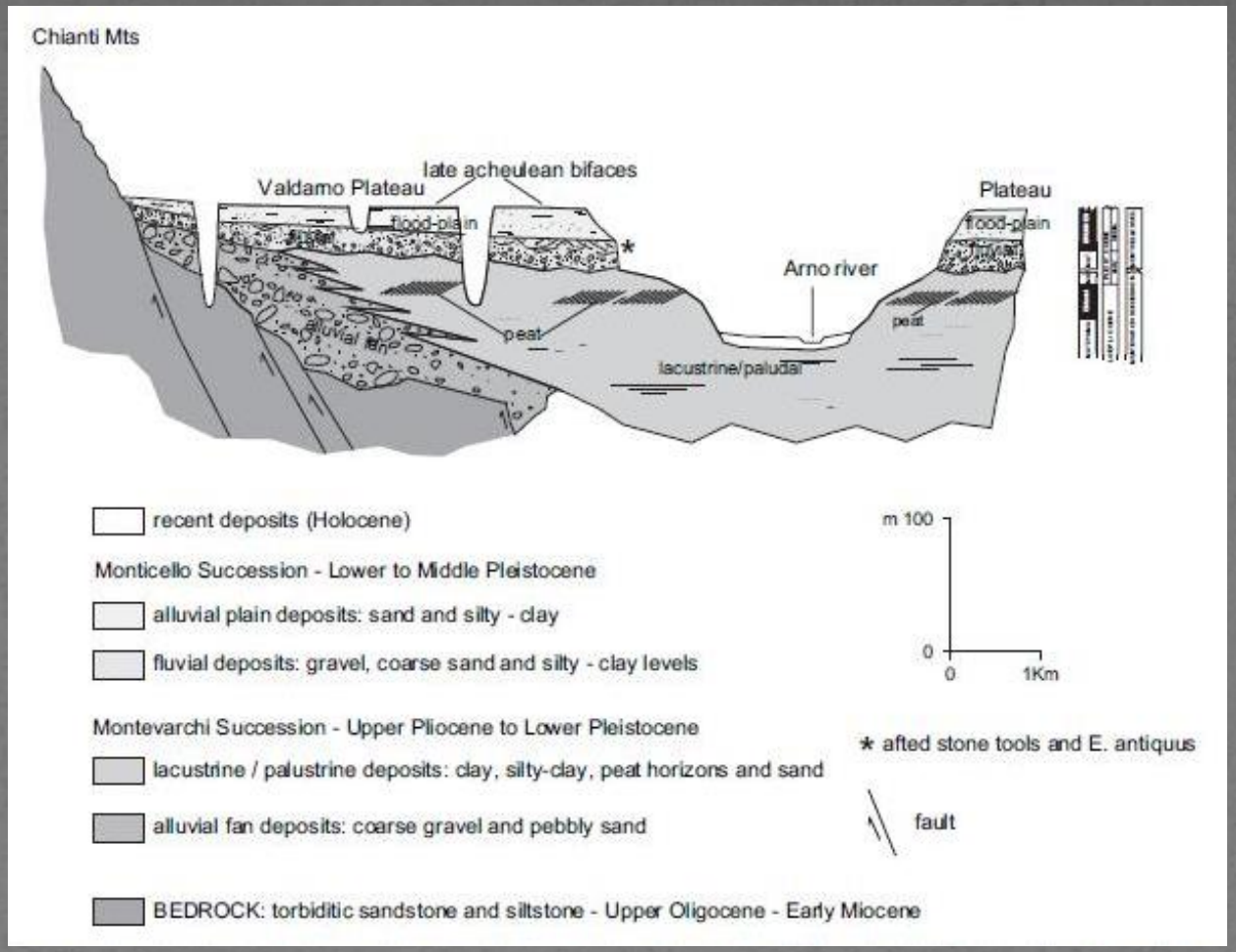
Selection and Use of Manganese Dioxide by Neanderthals

Peter J. Heyes[1], Konstantinos Anastasakis[2], Wiebren de Jong[2], Annelies van Hoesel[2], Wil Roebroeks[1] & Marie Soressi[1]

Campitello, central Italy, 250ky BP



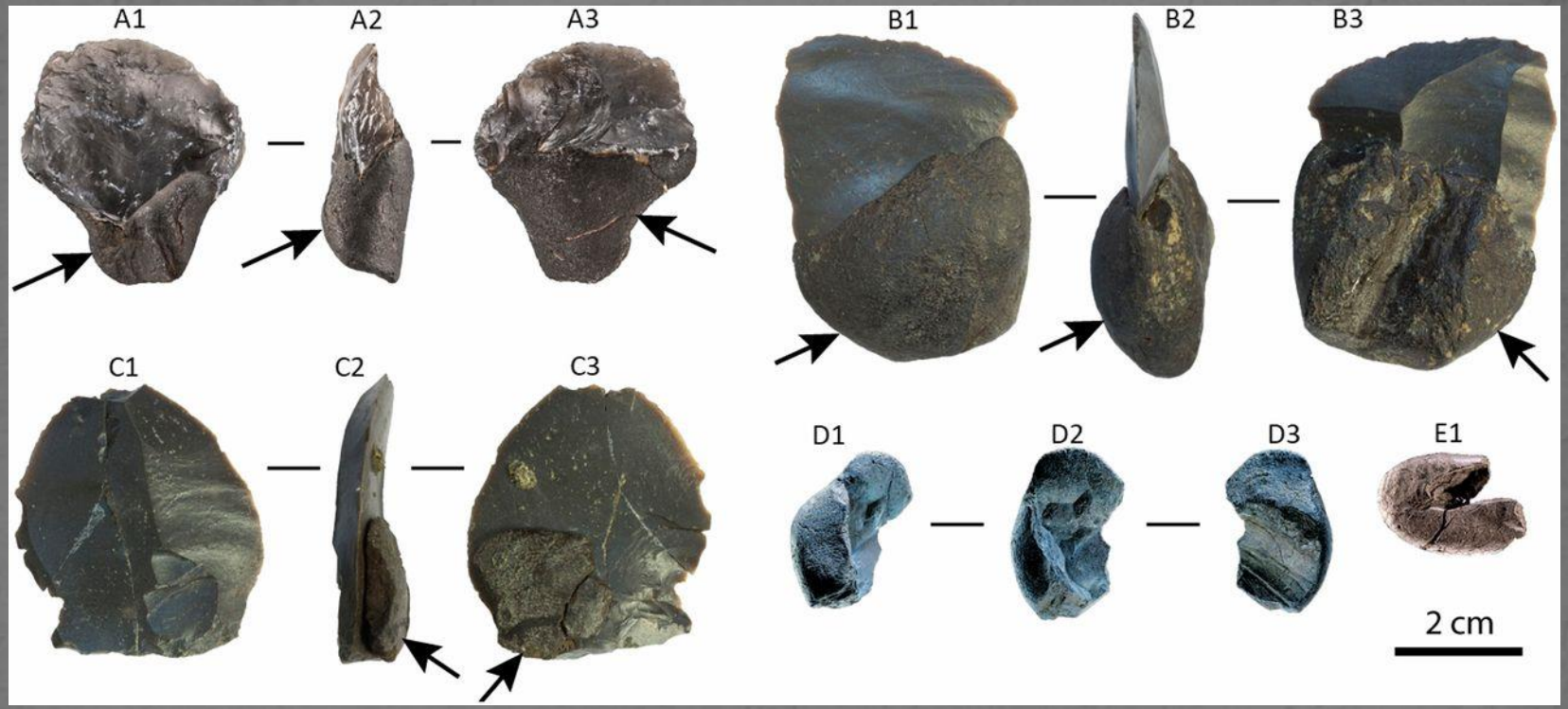
Simplified geological map of the Upper Valdarno Basin. The map shows: (1) recent and terraced alluviums; (2) Middle Pliocene fluvio-lacustrine sediments;
(3) Upper Pliocene-Lower Pleistocene fluvial sediments; (4) Middle-Upper Pleistocene sediments; (5) bedrock.



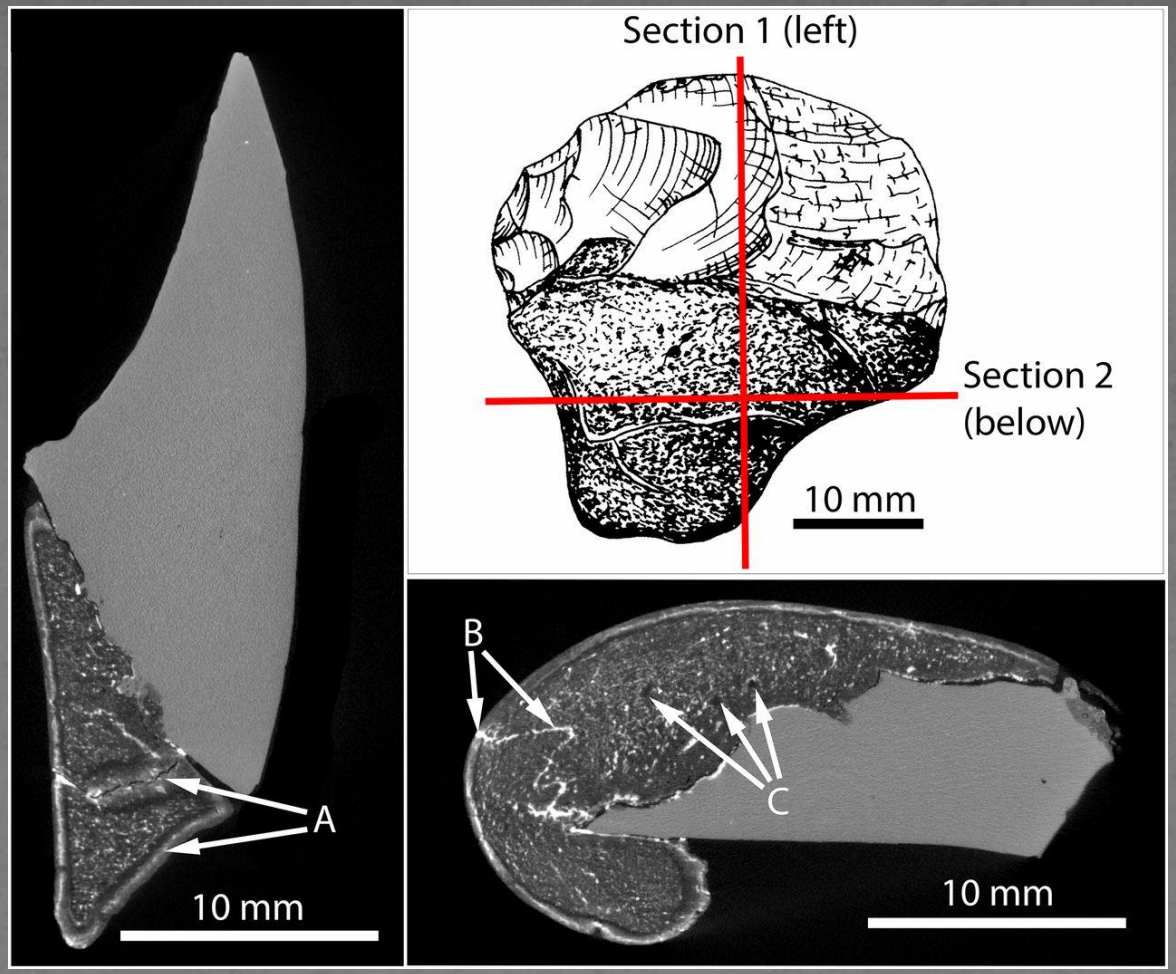
Schematic diagram of stratigraphy and palaeoenvironmental interpretation of the Upper Valdarno basin-fill deposits in the study area and stratigraphical position of the archaeological and palaeontological find.

(Hafted) Flake from Campitello with residues of birch bark

Securely identified Middle Paleolithic birch tar finds. (A) Zandmotor. (B and C) Campitello flakes. (D) Königsaue A. (E) Königsaue B.

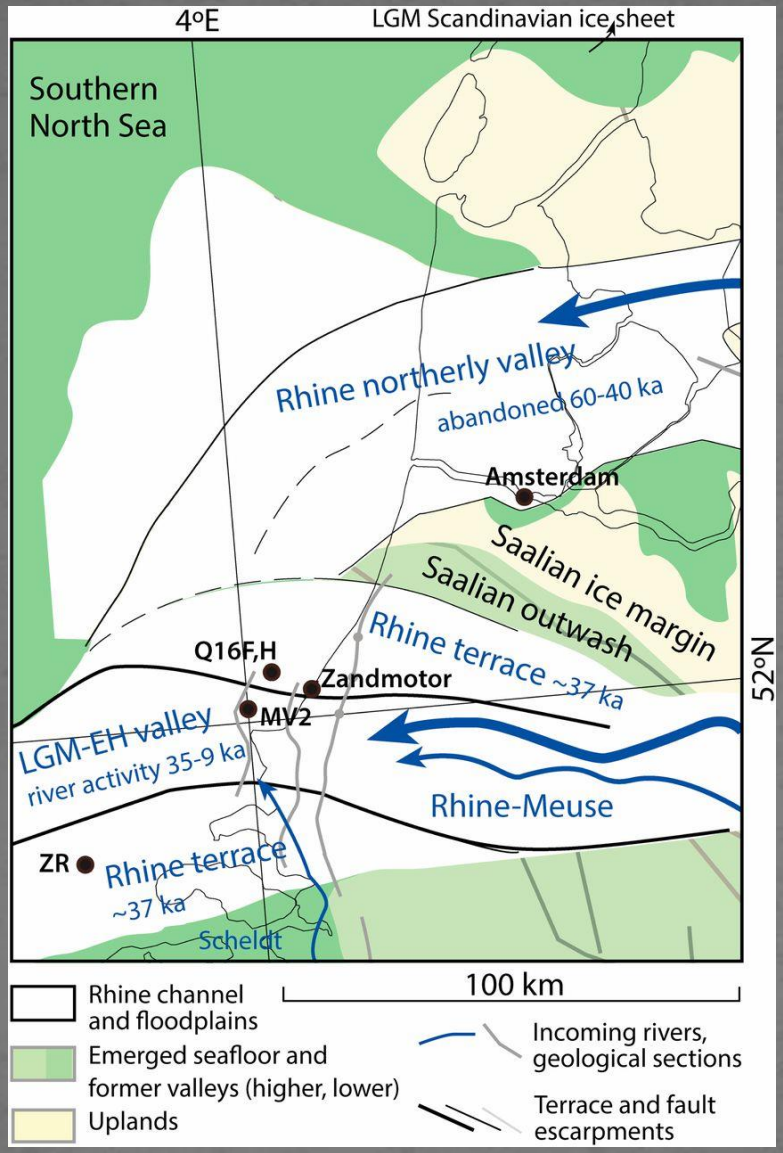


Marcel J. L. Th. Niekus et al. PNAS
doi:10.1073/pnas.1907828116



Zandmotor. Micro-CT cross-section scans. (*A*) Weathered surface coating the tar and penetrating along an open crack. (*B*) Veins of highly attenuating matter following cracks in the tar. (*C*) Possible charcoal fragments.

Marcel J. L. Th. Niekus et al. PNAS
doi:10.1073/pnas.1907828116



Paleogeography for the Rhine-Meuse-Scheldt Valley and surroundings during the Last Glacial. Black dots indicate the relevant find locations: Zandmotor (tar find location, B4 depletion); Q16 F, H (dredging site for the Zandmotor beach); MV2 (Rotterdam Maasvlakte 2, find location MP artifacts, B4 sand depletion); ZR (Zeeland Ridges, find location Neandertal skull fragment, B4 outcrop).

Marcel J. L. Th. Niekus et al. PNAS
doi:10.1073/pnas.1907828116

PNAS

The Lower to Middle Paleolithic transition in Europe

The European Middle Paleolithic is defined by the appearance of Levallois technology by about 300,000 years ago and associated changes in the conception of tools. The Levallois technology is a major innovation of the Middle Pleistocene.

If we were to take the disappearance or the decline of bifaces as the **marker of the Middle Paleolithic**, we should say that there is really no transition nor a clear boundary between the Lower and Middle Paleolithic.

Tools made on flakes, once considered a feature of the Middle Paleolithic, are common in Acheulian industries, as well as in Middle Paleolithic industries; during the Middle Paleolithic, industries with bifaces are as common as industries without bifaces.

However, the appearance of Levallois technology marks important structural changes in stone artifact assemblages.

Bifaces in the Middle Palaeolithic: continuity or discontinuity?

The apparent continuity between the two major phases of the European Paleolithic based on the presence of bifaces in both periods is discussed and rejected.

The Middle Paleolithic bifaces are quite different in conception from the classic Acheulian handaxes. The bifacial knives of the **Keilmesser** group in Central and Eastern Europe and the bifaces of the Mousterian of Acheulian Tradition in SW France have a standardized morphology and specific functions. Both kinds of tools were resharpened, modified and had a long use life. Other bifacial pieces had one or more working edges and can be typologically assimilated to flake tools.

Current speculations about changes in hunting patterns and the reorganization of human societies around base camps in the Middle Pleistocene are discussed.

The Emergence of Levallois

Some authors believe that the Levallois method had its origins in Africa and was spread to Europe and the Near East through the immigration of African hominids; for others, the evolution of the Levallois technology in Europe is an in situ phenomenon, emerging through a gradual evolution.

It has been argued that the Levallois method is conceptually derived from the shaping method characteristic of handaxes.

The final purpose of the Levallois method is the production of select flakes; in bifacial shaping, the block or blank is reduced through flaking to a desired form. The two systems appear opposite each other; yet, in the Levallois there is an elaborate shaping phase controlling the core volume and morphology prior to the detachment of the desired flakes.

Thus it should not be a surprise that the Levallois technology never developed in areas mostly **lacking handaxes (as in China)**, and that in the Middle Paleolithic bifaces underwent a transformation that made them somewhat equivalent to flake tools. It is significant that bifaces or bifacial pieces are not an important element in early Middle Paleolithic industries characterized by Levallois debitage. There is, in fact, a marked decrease in proportions of bifaces in industries of MIS 8 and MIS 7 compared to the previous periods.

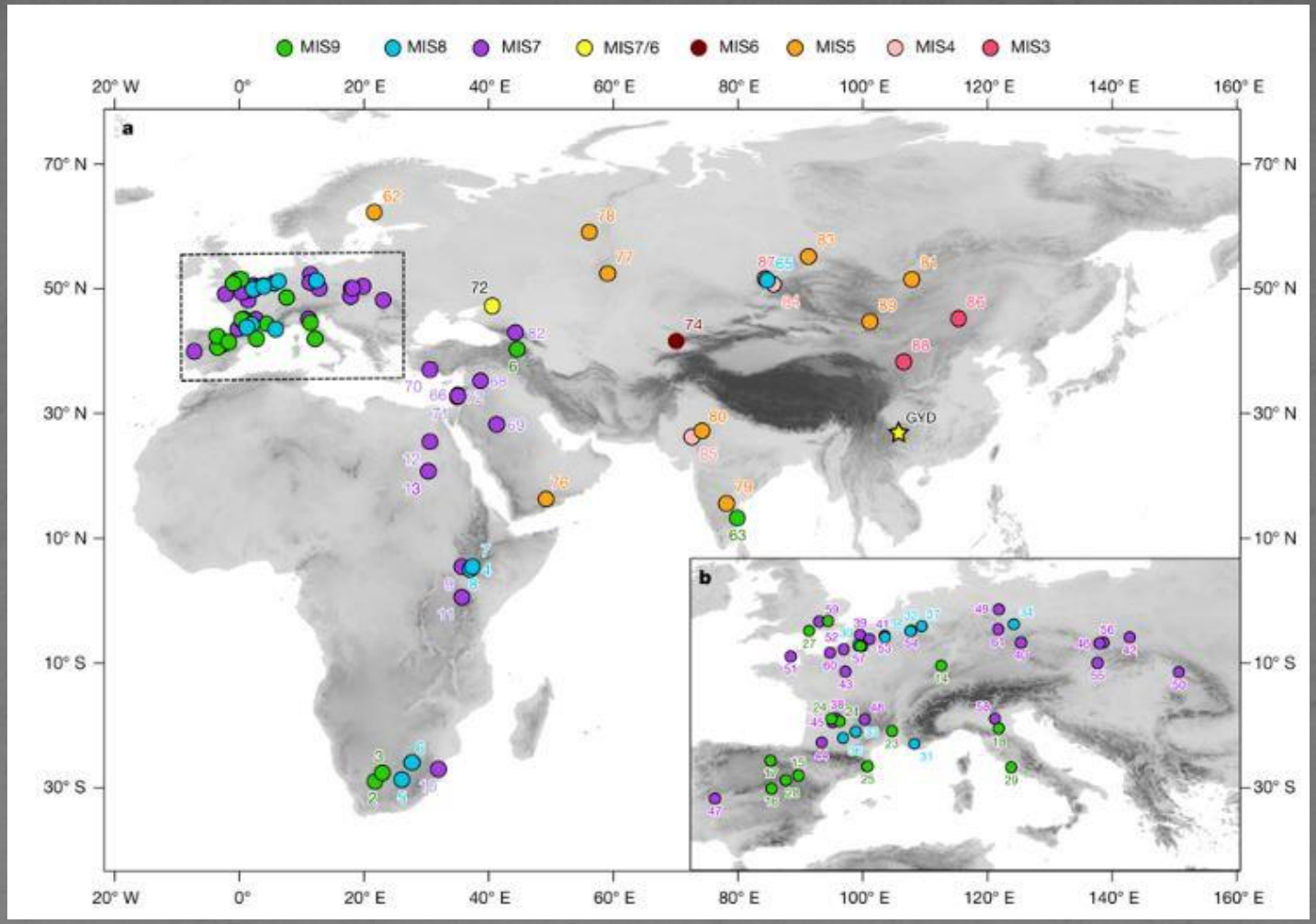
LETTER

https://doi.org/10.1038/s41586-018-0710-1

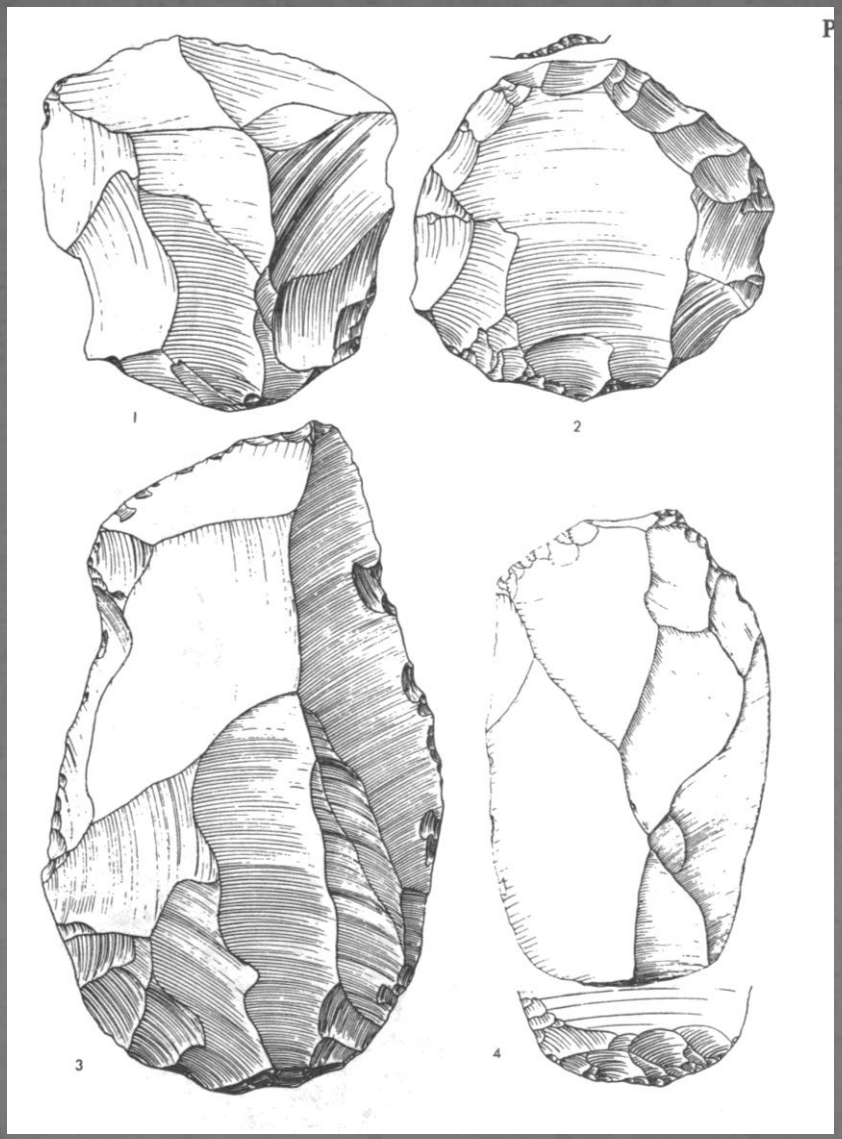
Late Middle Pleistocene Levallois stone-tool technology in southwest China

Yue Hu[1], Ben Marwick[1,2*], Jia-Fu Zhang[3], Xue Rui[1], Ya-Mei Hou[4,5], Jian-Ping Yue[4,5], Wen-Rong Chen[6], Wei-Wen Huang[4] & Bo Li[1,7*]

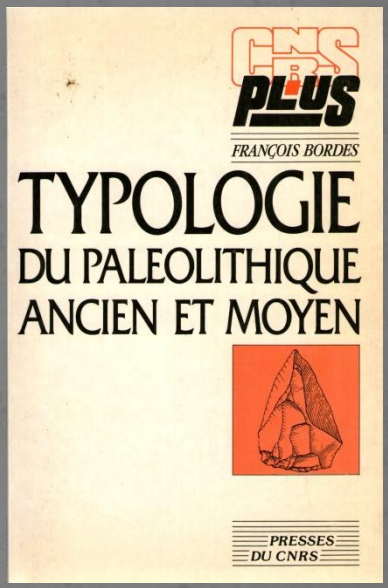
….Here we present evidence of Levallois technology from the lithic assemblage of the Guanyindong Cave site in southwest China, dated to approximately 170,000–80,000 years ago. To our knowledge, this is the earliest evidence of Levallois technology in east Asia. Our findings thus challenge the existing model of the origin and spread of Levallois technologies in east Asia and its links to a Late Pleistocene dispersal of modern humans.

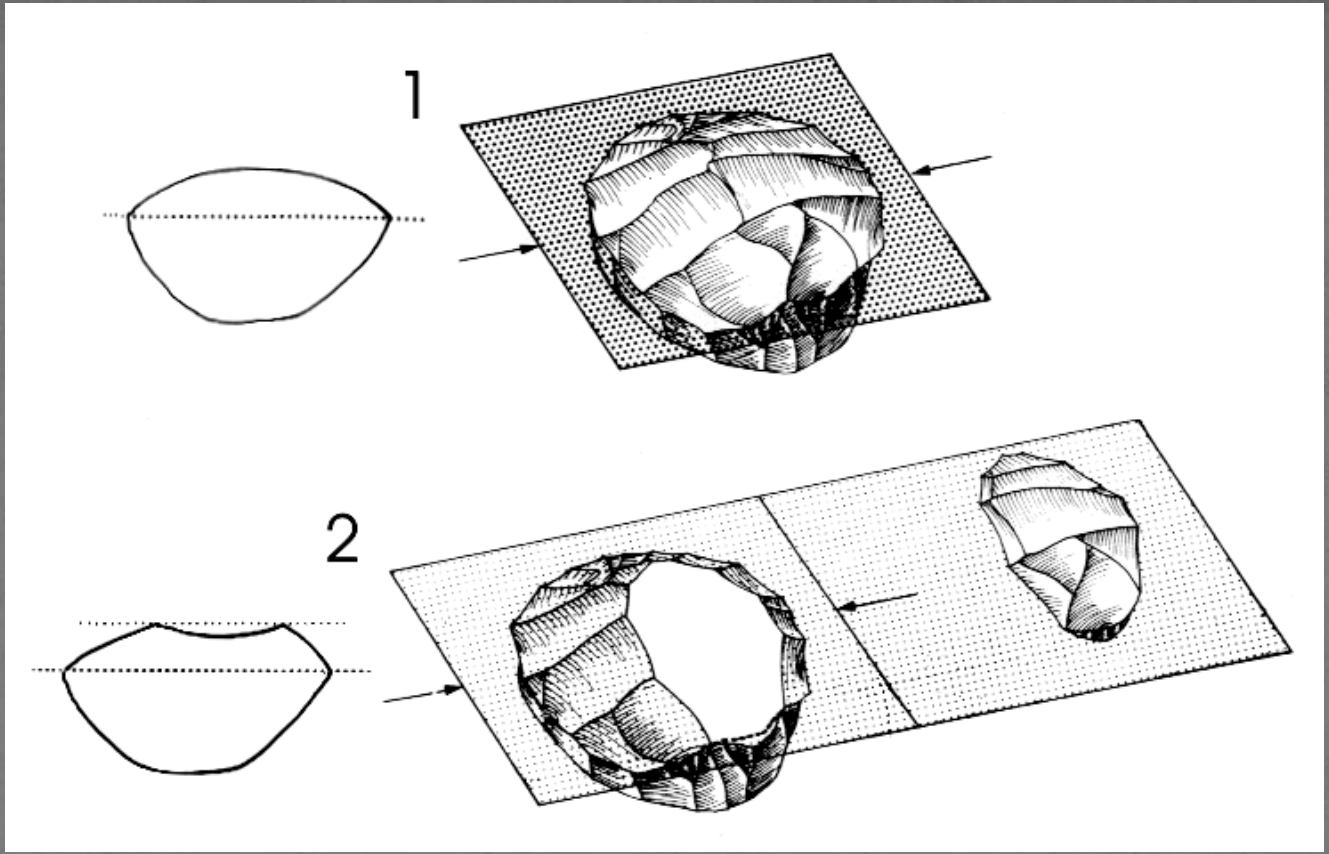


a, b, Distribution of Levallois technology across Africa and Eurasia. b, Magnification of the region inside the dashed rectangle in a. The MIS corresponding to the chronology of individual sites is indicated by different colour-coded symbols. Note that there are a large number of sites that are younger than MIS 7 in Europe and Africa. GYD, Guanyindong Cave.



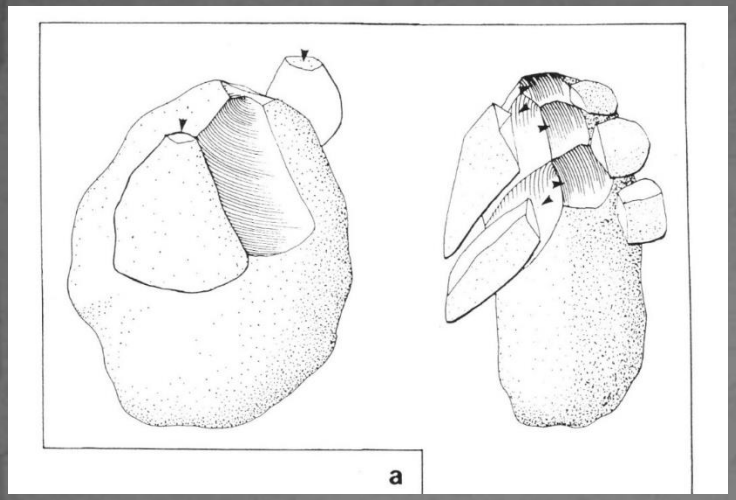
Levallois flakes



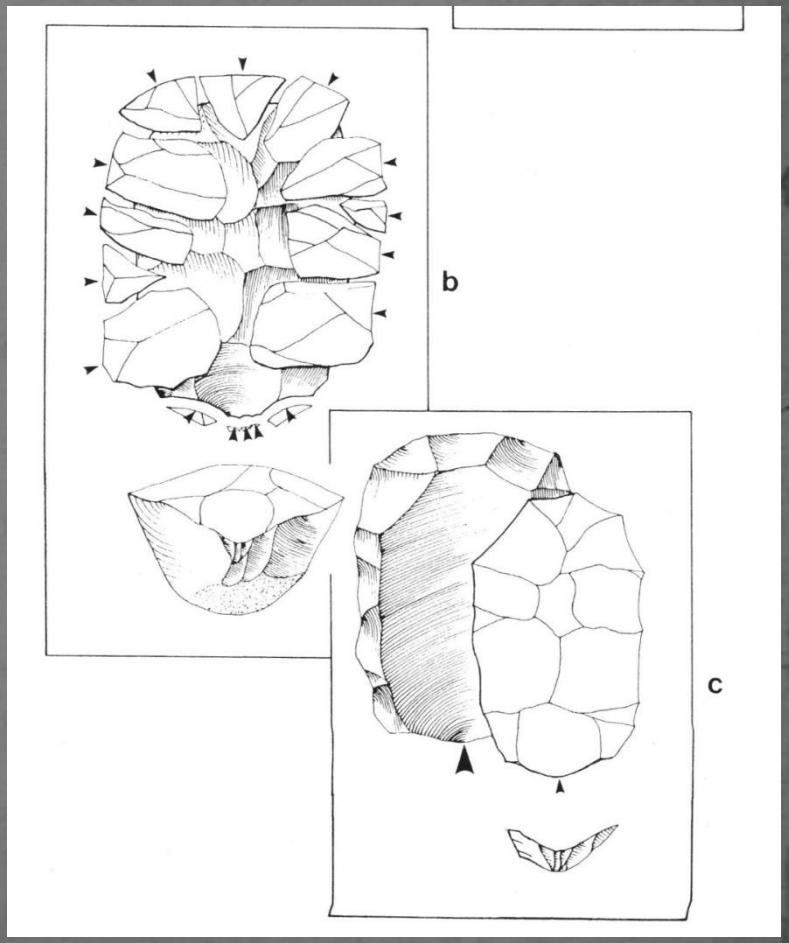


The Levallois core and the main morfotechnical elements which characterise the volumetric structure after the preparation, namely the two convex surfaces, the plain separating these two surfaces, the faceted striking platform, the regular upper convexity (1); the modification of the volume produced from the detachment of a predetermined flake parallel to the plain of separation (2) (from Boëda, 1994).

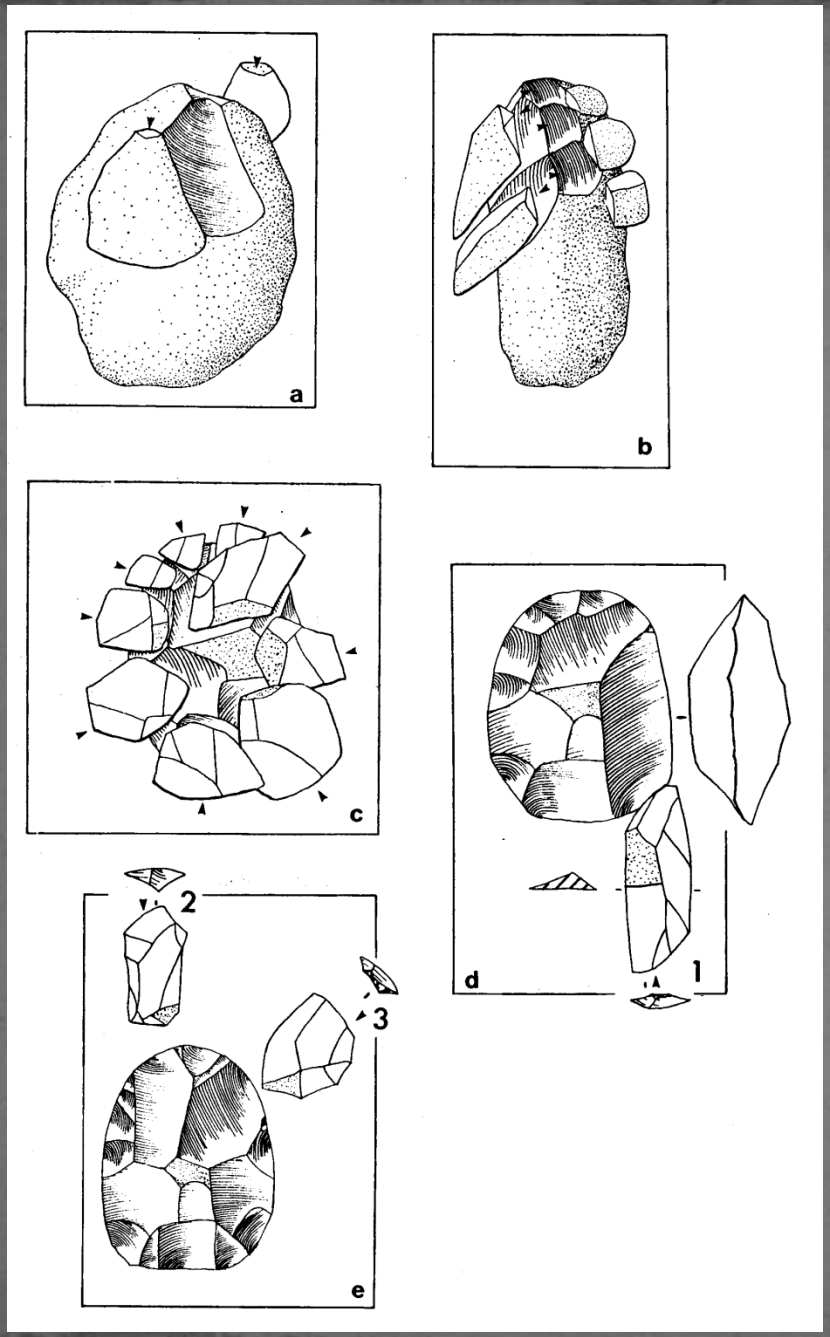
Preferential Levallois modality



a) detachment of cortical flakes from a flint nodule for the preparation of the core.

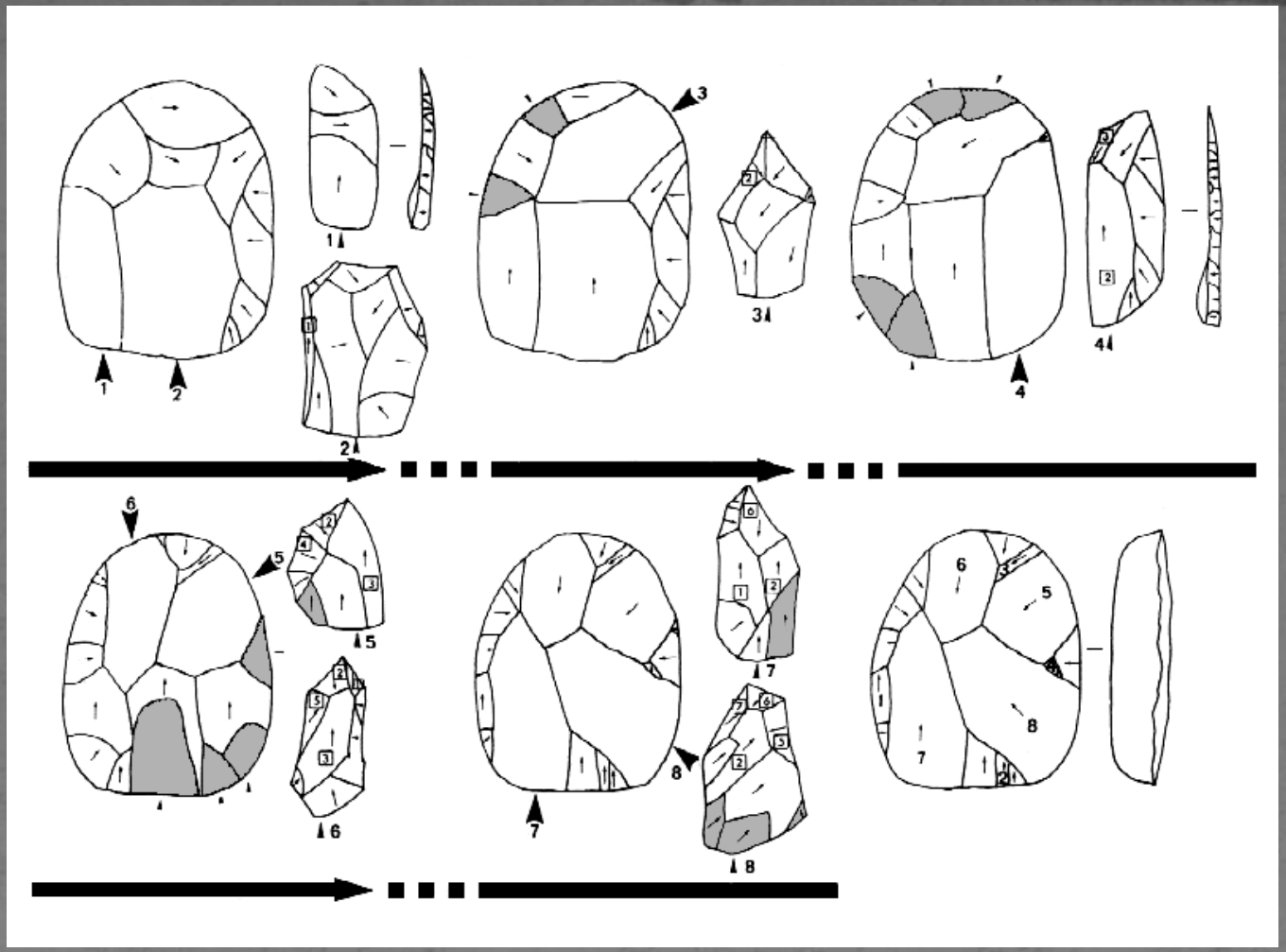


b) detachment of flakes for the preparation of the flaking surface and, below, of the striking platform;
c) detachment of a Levallois preferential flake.
(from Inizan et al., 1992).

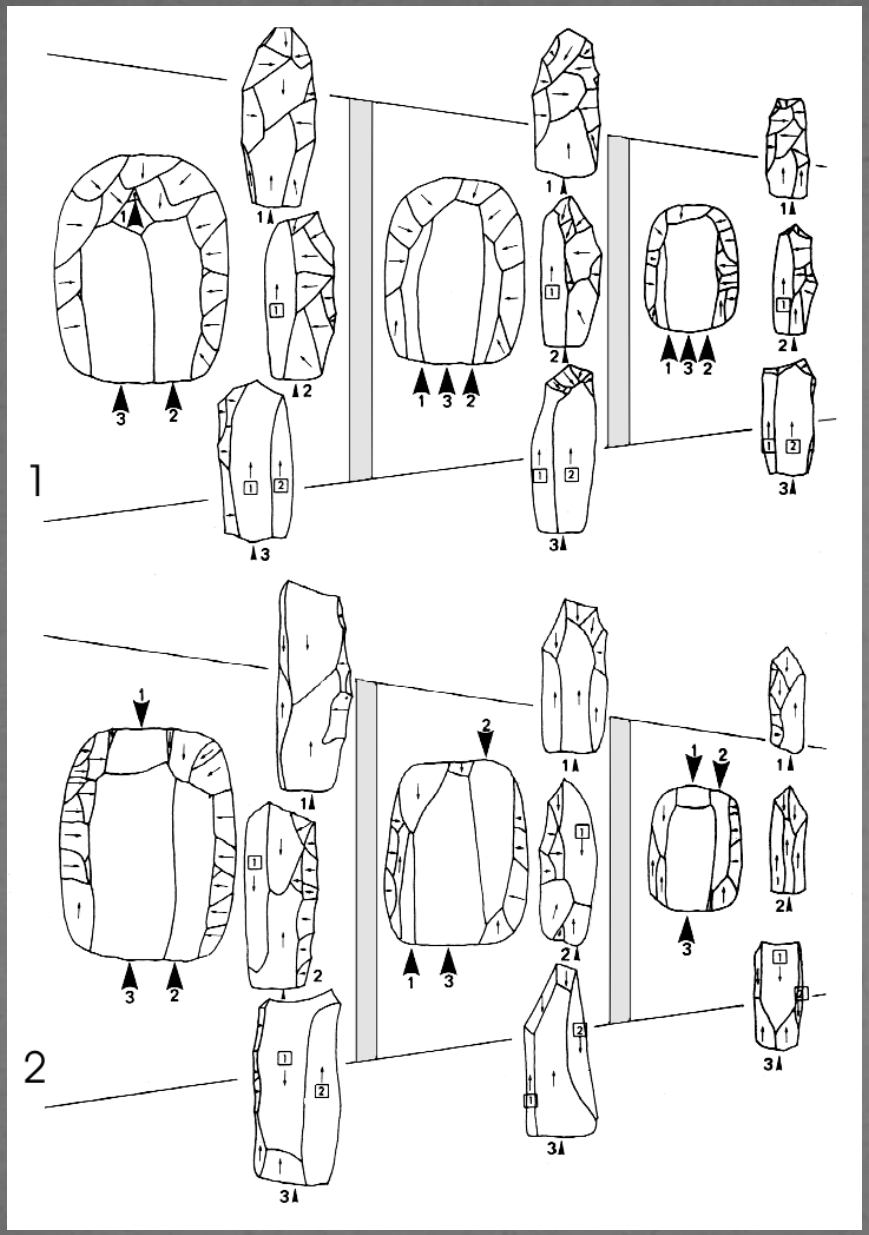


Centripete recurrent Levallois modality

a-b) detachment of cortical flakes from a flint nodule for the preparation of the core.
c) detachment of flakes for the preparation of the flaking surface;
d-e) detachment of a Levallois recurrent flakes (from Inizan et al., 1992).



Levallois Method, centripete recurrent modality which produces predetermined flakes (2, 3, 5, 6, 7, 8) and core-edge flake removals (1, 4), by successive partial shapings of the upper core convexity. In gray, the scars left from the preparation flakes (from Boëda, 1994).



Unipolar (1) and bipolar (2) recurrent Levallois modality, which allow to obtain more than one flake from a single prepared surface, aside from the gradual reduction of the core. After each series, a total or partial repreparation of the surface (in gray), allows to produce a new series of predetermined flakes (from Boëda, 1994).

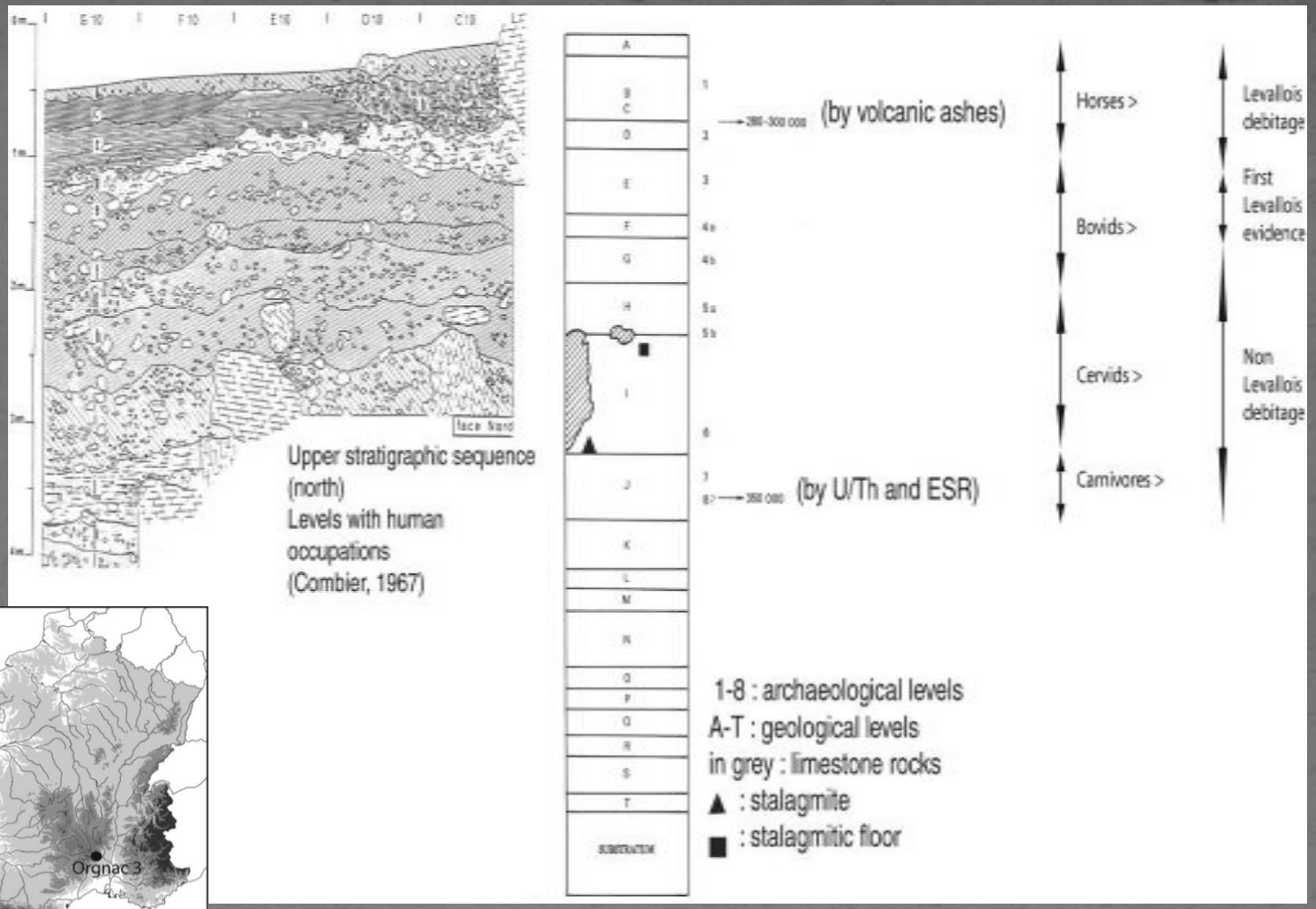
Origin of the Levallois Technology in Europe

The European Middle Paleolithic, now commonly defined by the appearance of the Levallois technology, began about 300,000 years ago; this is the evidence as it stands now.

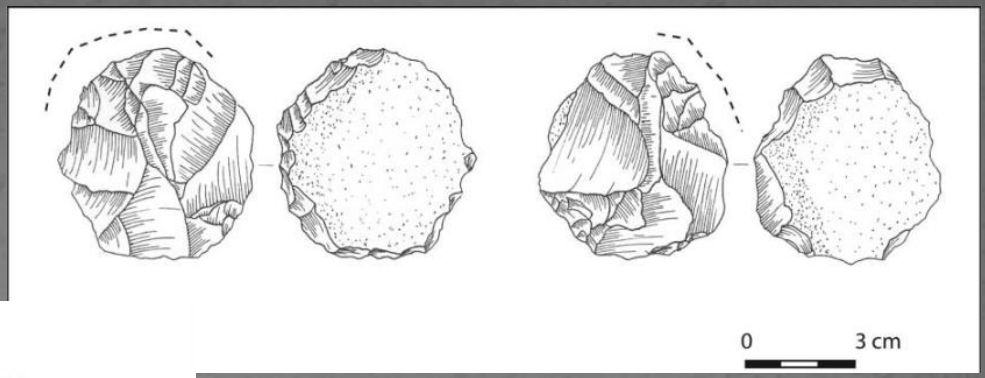
The Levallois technology is documented at a number of sites in western Europe dating to MIS 8—e.g., Argoeuves and Salouel in the Somme valley (northern France), Mesvin IV in Belgium, and Orgnac Level 5b in southern France. Purfleet in the Lower Thames Valley (England), with a core technology that has been defined as simple prepared core technology (= proto-Levallois of earlier authors) appears to be slightly older, at the transition between MIS 9 and 8. The Levallois technology in Western Europe might even be older than MIS 8, but at present, the evidence is not strong enough.

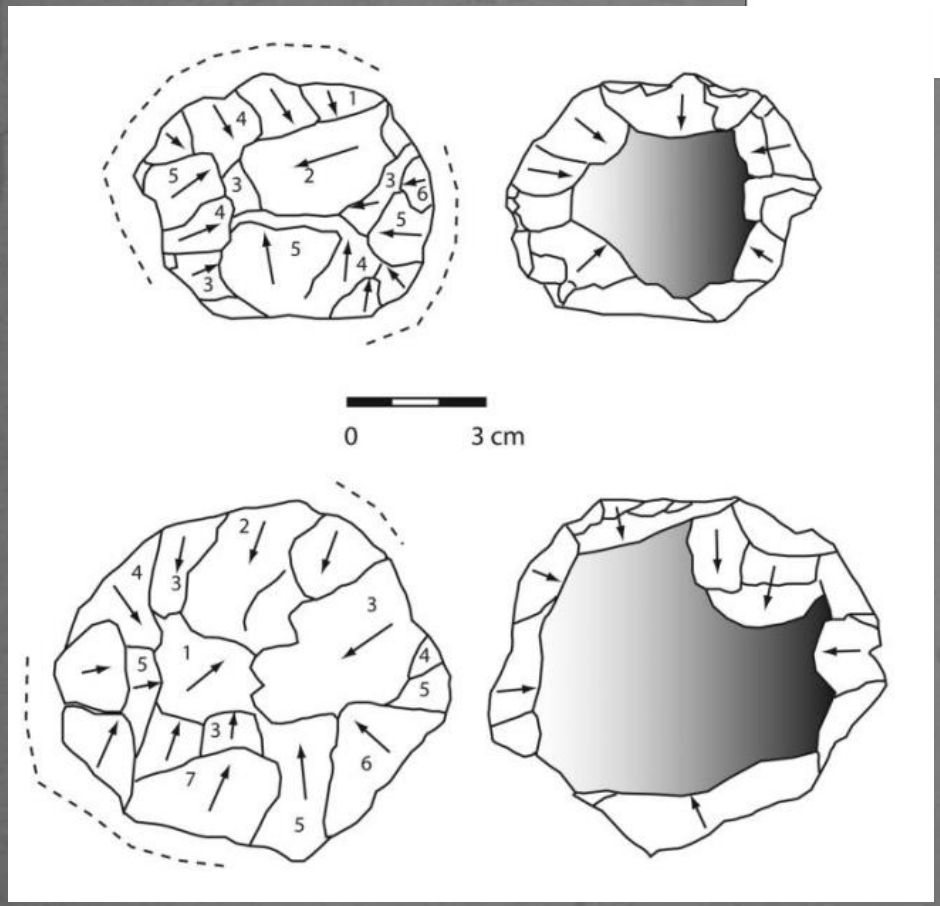
The archaeological evidence shows a patchy appearance of Levallois method in **Europe**.


MIS 9/8
PURFLEET
KESSELT-OP DE SCHANS
MESVIN IV
BIŚNIK CAVE
PETIT BOST
LE BOSSES
RASPIDE 2
ORGNAC 3
GRAN DOLINA
AMBRONA
LA SELVA
ARIDOS 1
LEVALLOIS + HANDAXES
LEVALLOIS



Stratigraphy and schematic profile of the Orgnac 3 sequence. The right part of the scheme presents data of the large-mammal characteristics and the presence/absence of Levallois debitage throughout the sequence.





Flint cores from level 1 at Orgnac 3: Levallois debitage and then final peripheral knapping of small flakes (*dashed line*, variability of the location area of the small flakes).

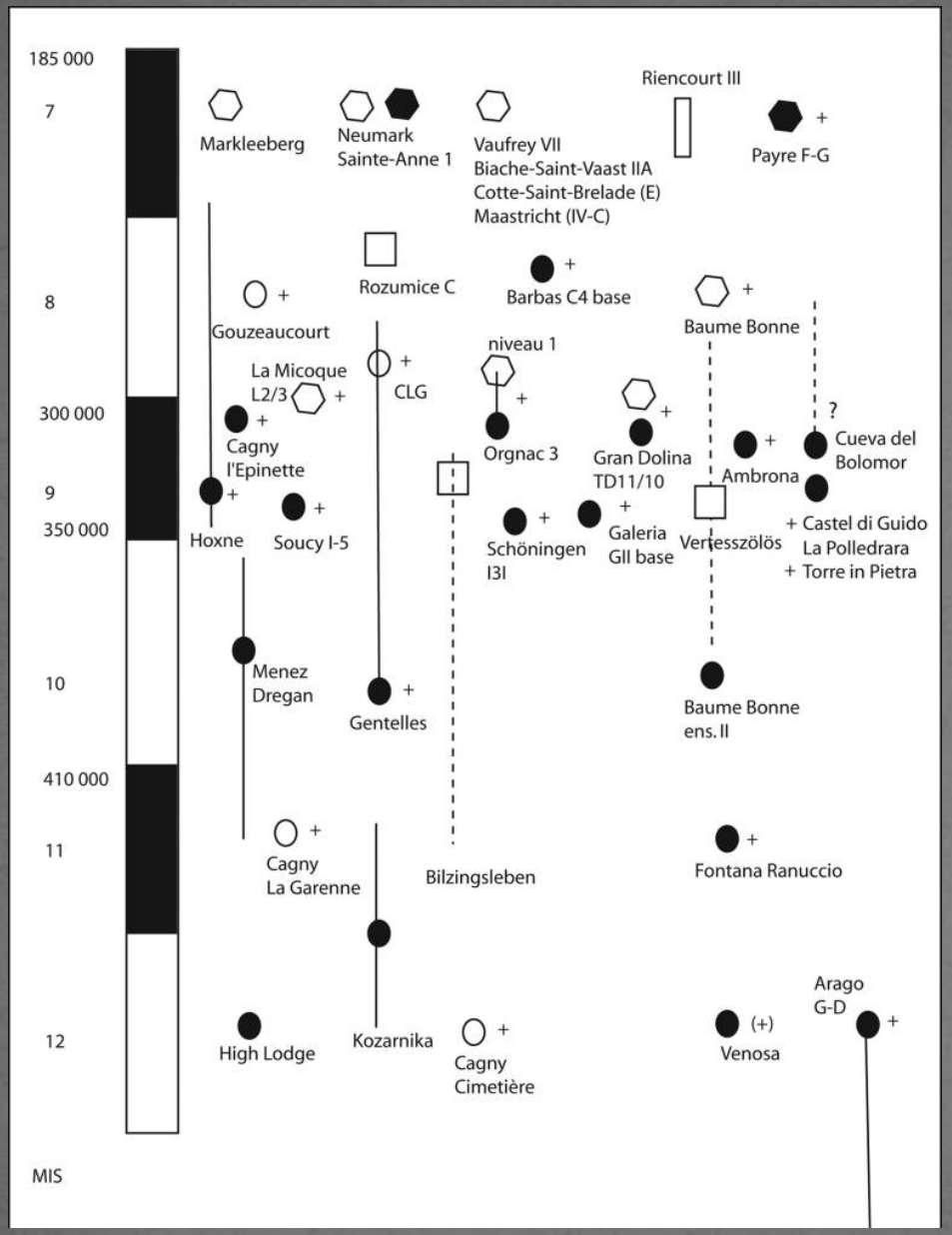
Coexistence between Levallois and bifaces and other technologies

Throughout the Middle Pleistocene, there is a long coexistence between industries based on Levallois technology and biface industries.

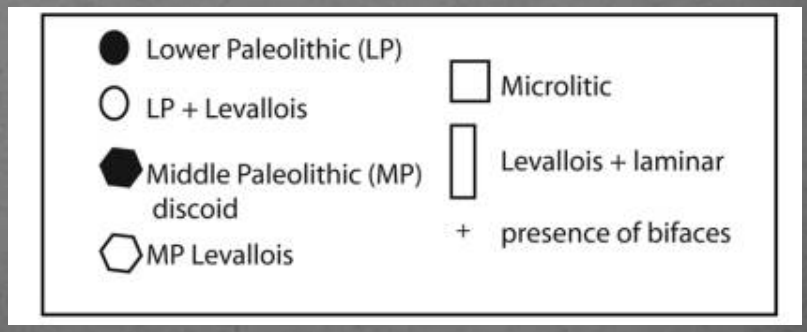
In Western Europe, industries with bifaces and non-Levallois debitage (e.g., Cagny l'Epinette level H, Gouzeaucourt, Gentelle) occur throughout MIS 8 to 6, together with industries without bifaces and without Levallois debitage (e.g., Ariendorf, Schoningen, Tonchesberg), industries with Levallois debitage and some bifaces (e.g., Mesvin IV, Le Pucheuil, Vimy, La Cotte de Saint-Brelade Layer 5) and industries with Levallois debitage and without bifaces (e.g., Biache St. Vaast).


MIS 7
MAASTRICHT B.
NEUMARK-NORD 1
BAPAUME LES OSIERS
SALOUEL
LE RISSORI
LE PUCHEUIL
THERDONNE
BIŚNIK CAVE
ACHENHEIM
KOROLEVO
GRANDS ROIS
PETIT BOST
GROTTE VAUFREY
CANTALOUETTE
SAN BERNARDINO CAVE
CAMPSAS
TORRALBA
LEVALLOIS + HANDAXES
LEVALLOIS


MIS 6
MARKKLEEBERG
BIACHE S.V.
ARIENDORF 2
BIŚNIK CAVE
LE PUCHEUIL
LA COTTE S.B.
ACHENHEIM
ABRI SUARD
GROTTE VAUFREY
COUNDOULUS
LA BORDE
SAN BERNARDINO CAVE
EL CASTILLO
BAUMME BONNE
LEZETXIKI
LAZARET
CAMPITELLO QUARRY
GALERIA PESADA
CARIGUELA CAVE
POGGIO R.SHELTER
SOLANA DEL ZAMBORINO
ASCARIO CAVE
LEVALLOIS + HANDAXES
LEVALLOIS

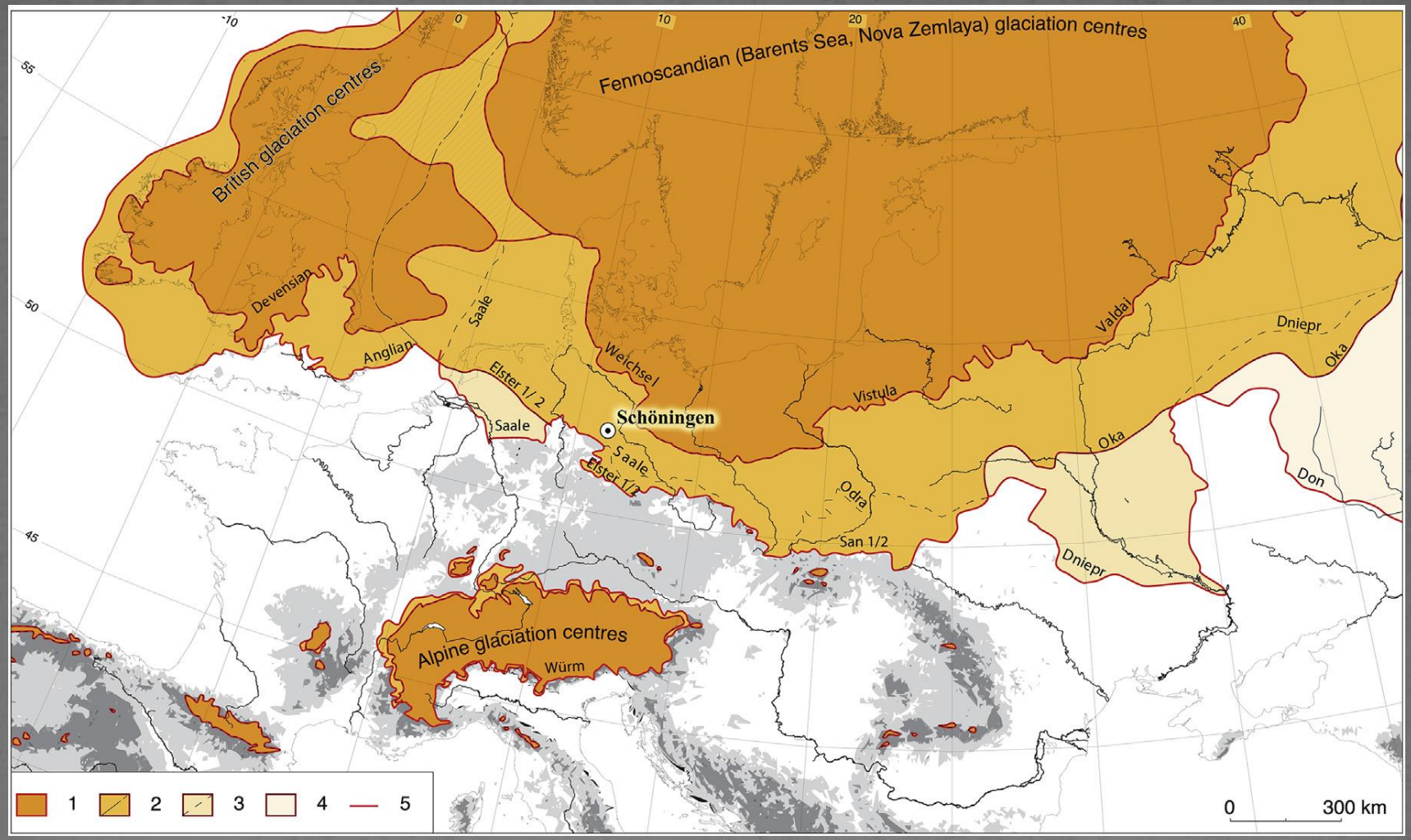


There is a significant degree of variability in early Middle Paleolithic assemblages (i.e., MIS 8 to 6). Several kinds of production sequences occur at the same site.



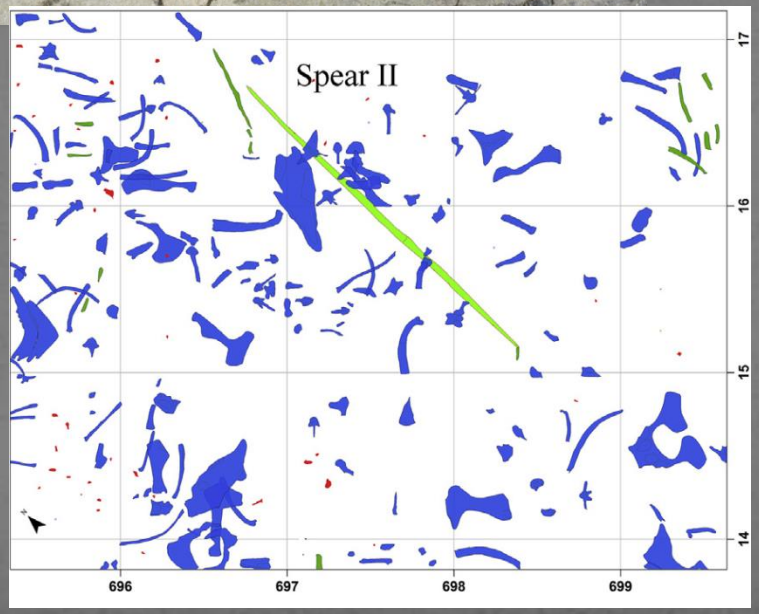
Hunting in the early Middle Palaeolithic: Schöningen, 300-337ky BP

- 3 javelins (spruce)
- Associated to horse bones and lithic implements
- 1,82-2,30 m long, pivot point at 2/3 of length
- Associated with a wood with pointed extremities (78 cm)



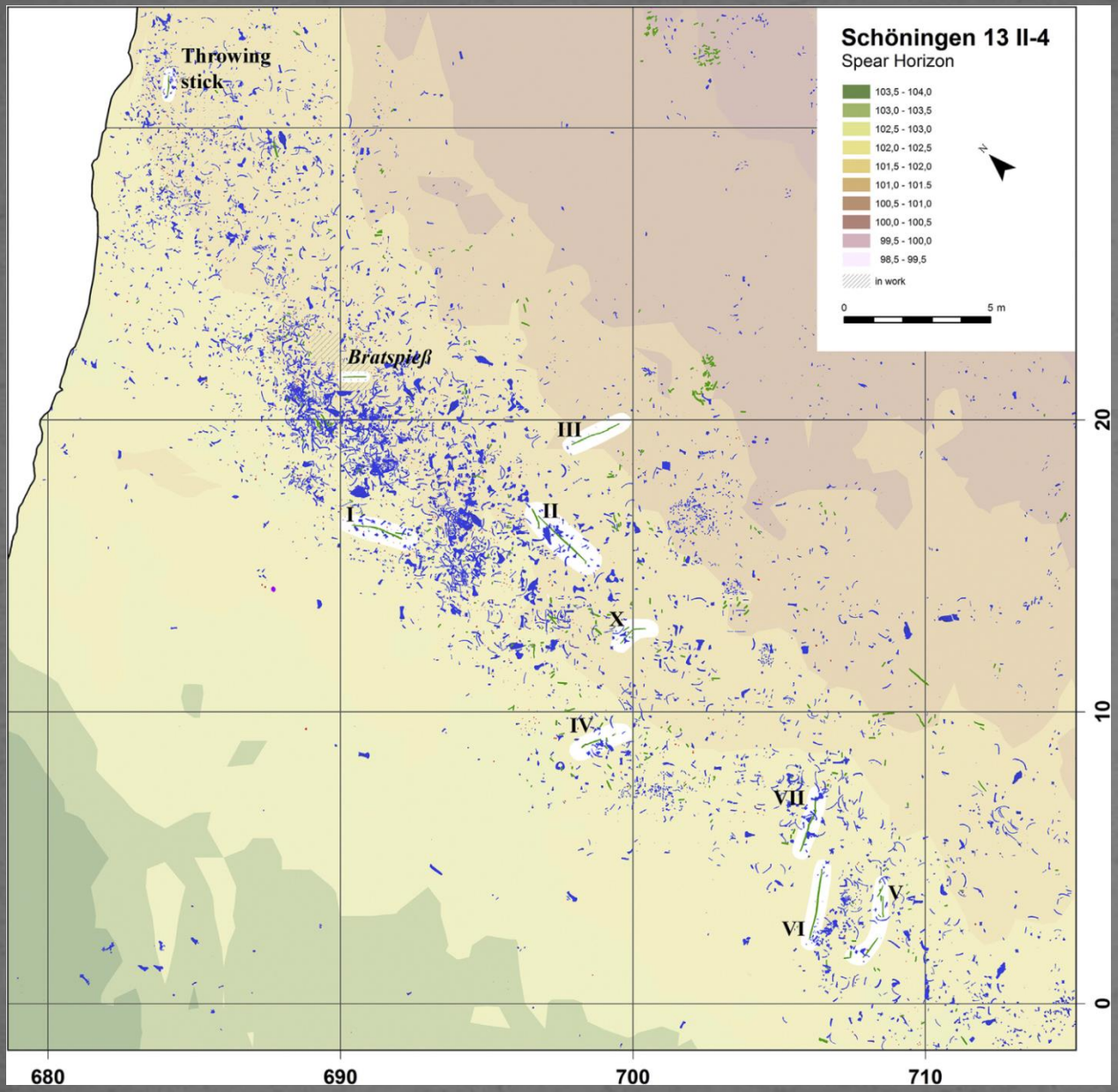
Schoeningen. Position of the locality between the maximum southern expansion of the Elsterian and the Saalian and Weichselian continental glaciers.


SCHÖNINGEN 13/94
QUAD. X 694 Y 31
TIEFE 101,45 NN
SCHICHT 4


Spear II
696
697
698
699
14
15
16
17

… an attribution to MIS 9, and by inference provides an age estimate of 337-300 ka for the oldest spears in human history….


II



Central distribution of finds with the deeper and wetter part of the find horizon to the east, and higher and drier part of the find horizon to the west. The “throwing stick” from 1994 and spears I, II, III, IV, V, VI, VII, and X are indicated in the distribution.

Each square depicted is 10x10 m.

Spears I, II, III, and VI.

Spearhead of spear II in detail with cut marks

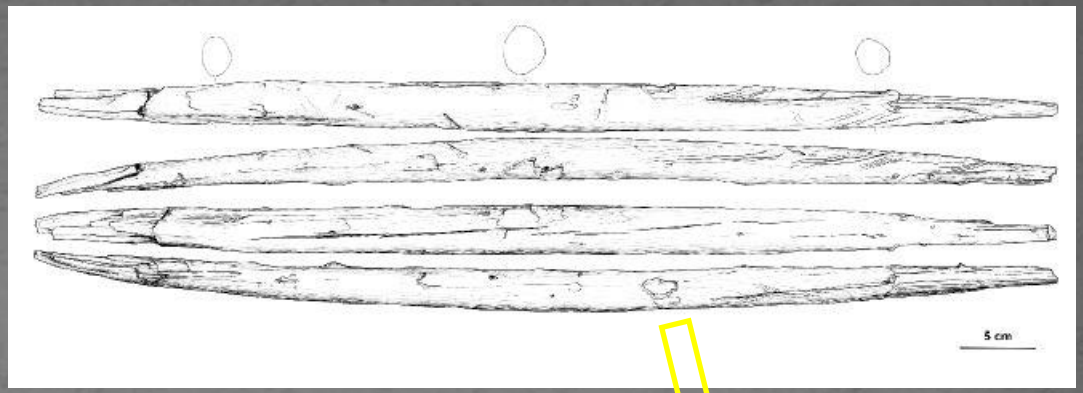
Detail of spear III with cut marks on a truncated branch and smoothed surface.

Detail of spear V with a truncated branch and emerging tree rings as result of woodworking.

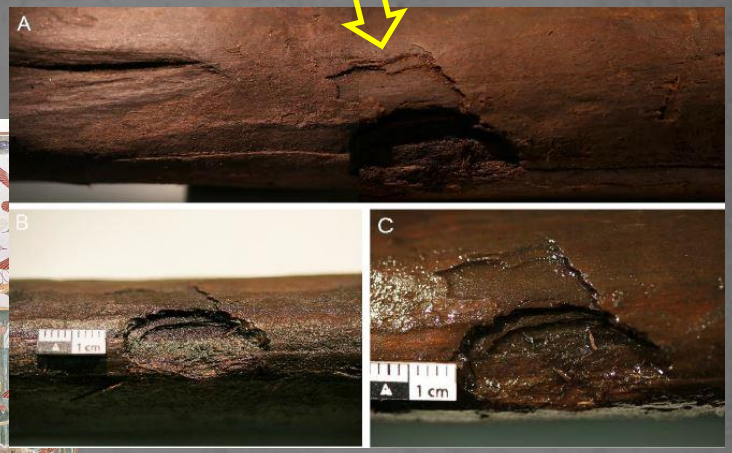
nature ecology & evolution SUPPLEMENTARY INFORMATION

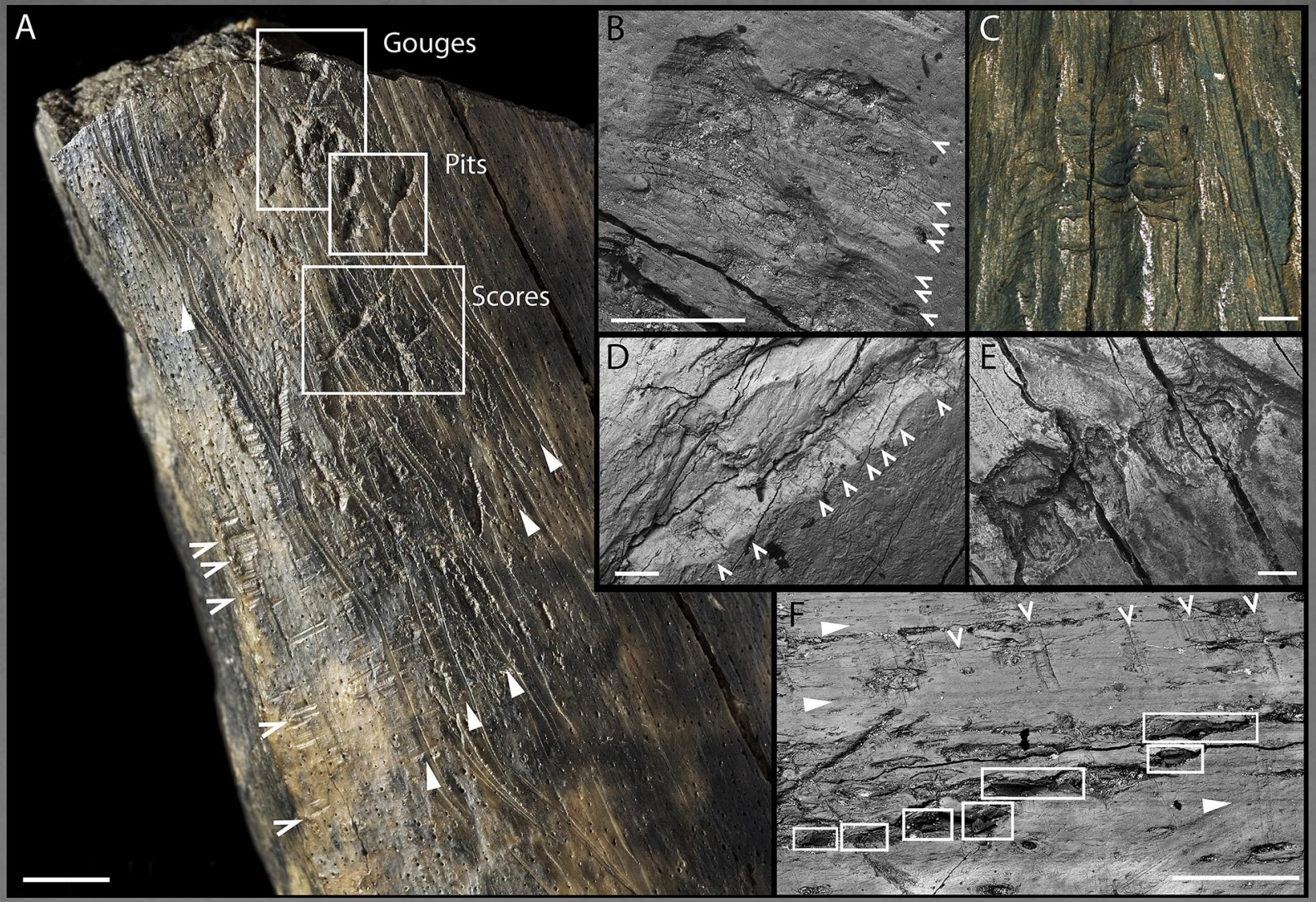
A 300,000-year-old throwing stick from Schöningen, northern Germany, documents the evolution of human hunting

Nicholas J. Conard, Jordi Serangeli, Gerlinde Bigga and Veerle Rots



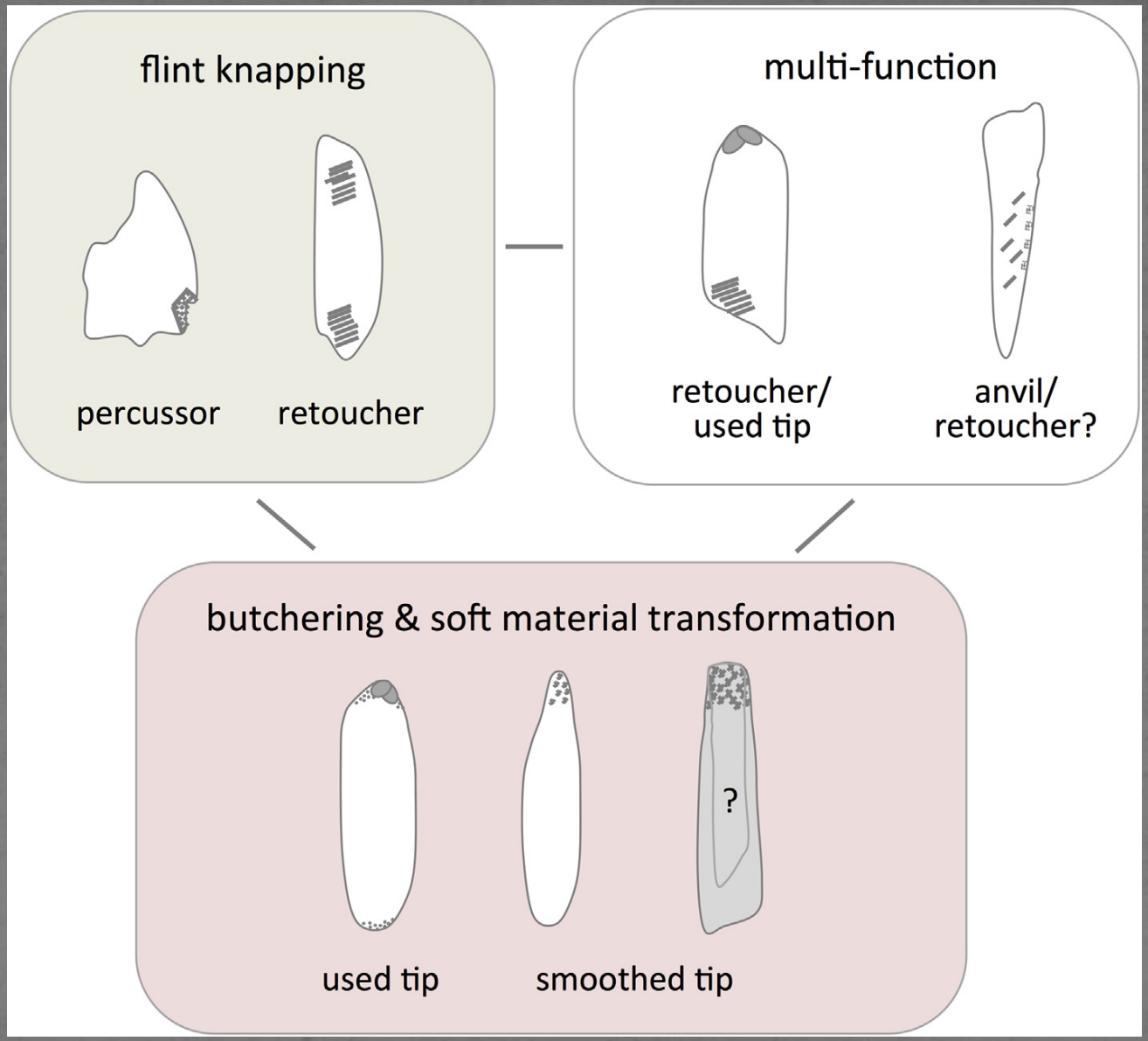
Throwing stick from Schöningen



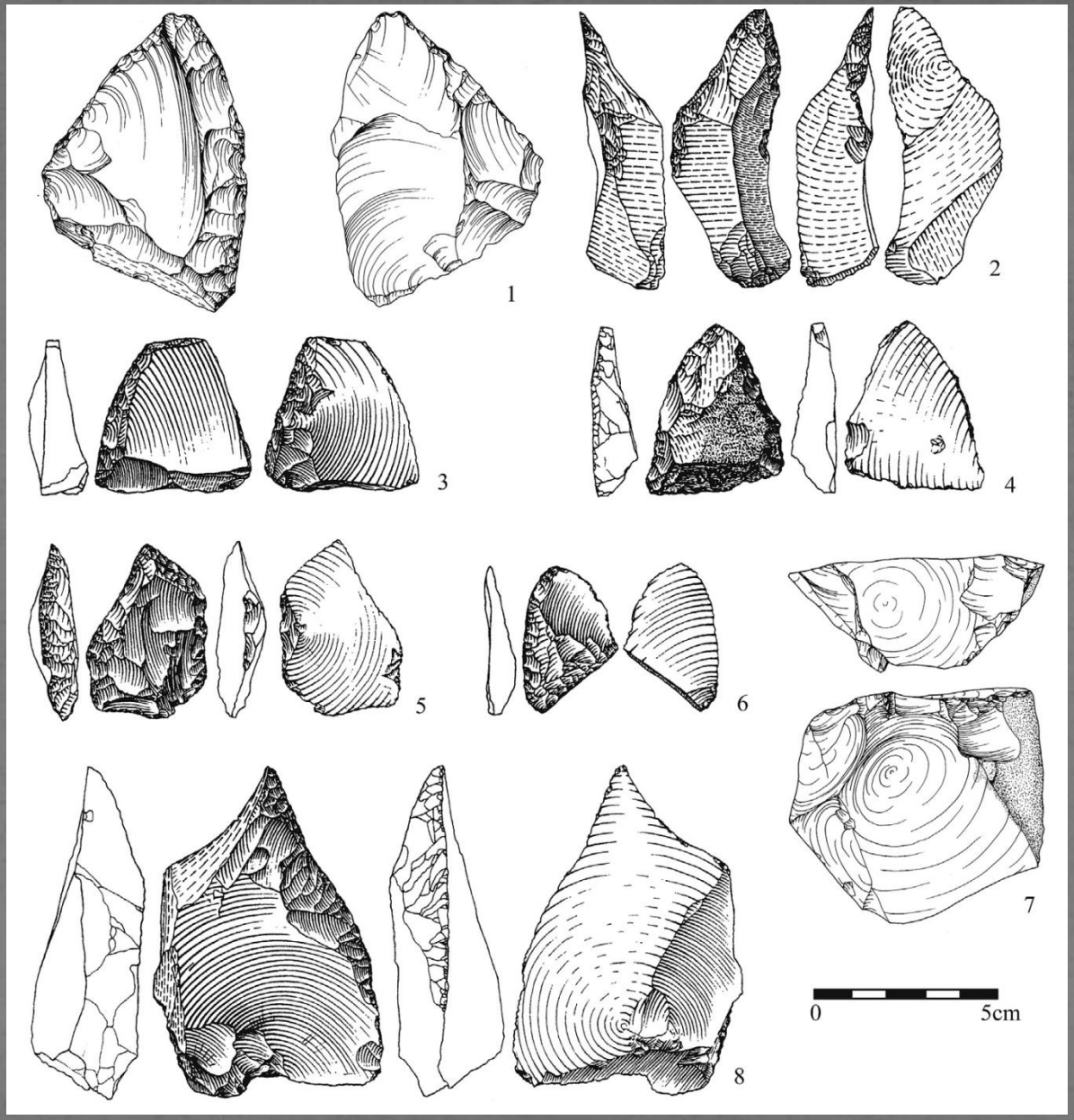


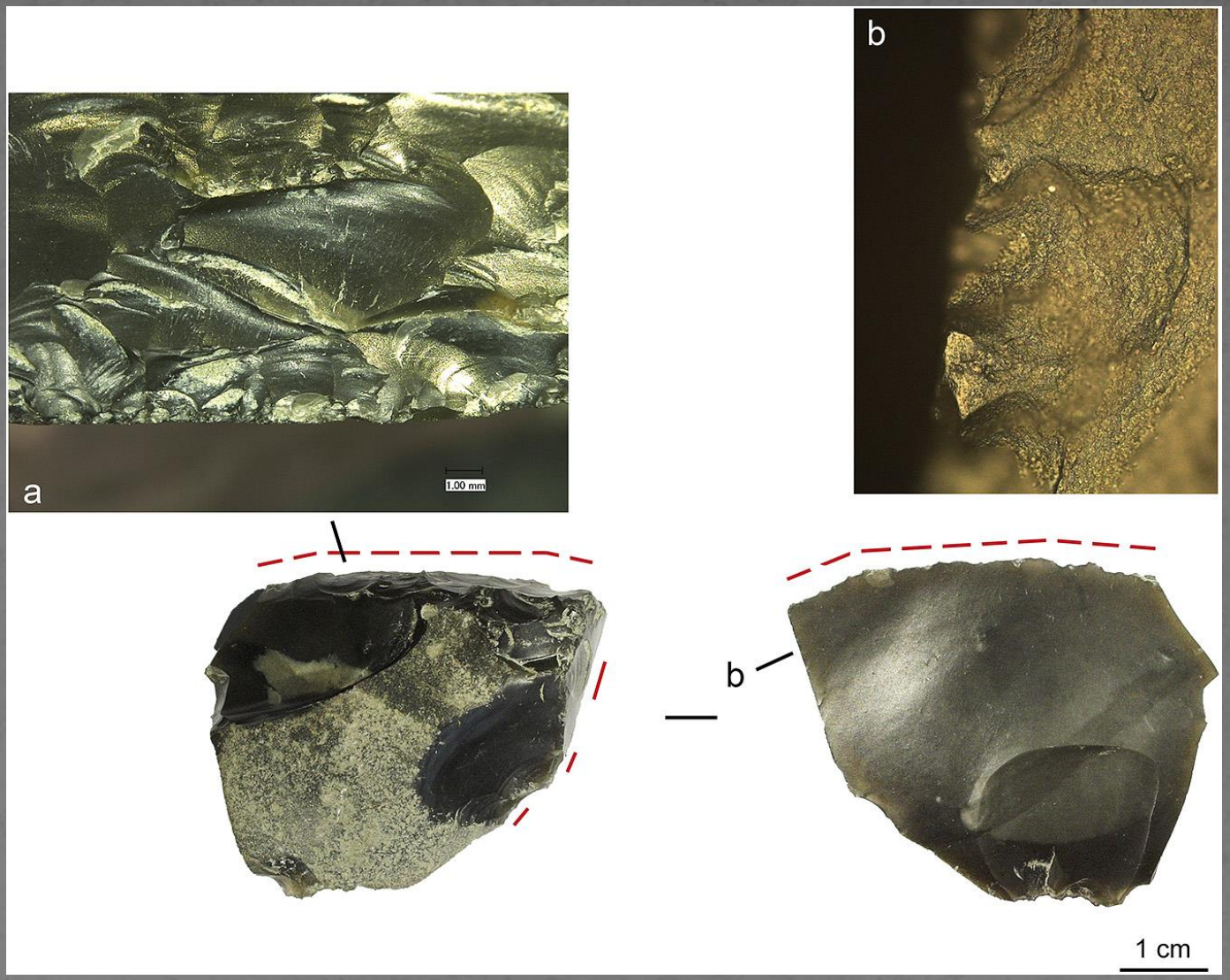
(A) Photograph of long bone shaft fragment with knapping marks. Boxes indicate clusters of gouges, pits and scores. Prominent scrape marks are indicated by white triangles and tool-edge scratches by open arrows. The SEM and FVM images compare pits and scores inflicted during knapping (B and D) with marks produced by insects (C) and carnivore chewing overlying cut marks (E). Open arrows indicate internal microstriations. F) Scrape marks (white triangles) truncated by tool-edge scratches (white open arrows) and a knapping score containing fractured flint (examples framed by boxes).


A
B
C
B
C
D
E
D
E

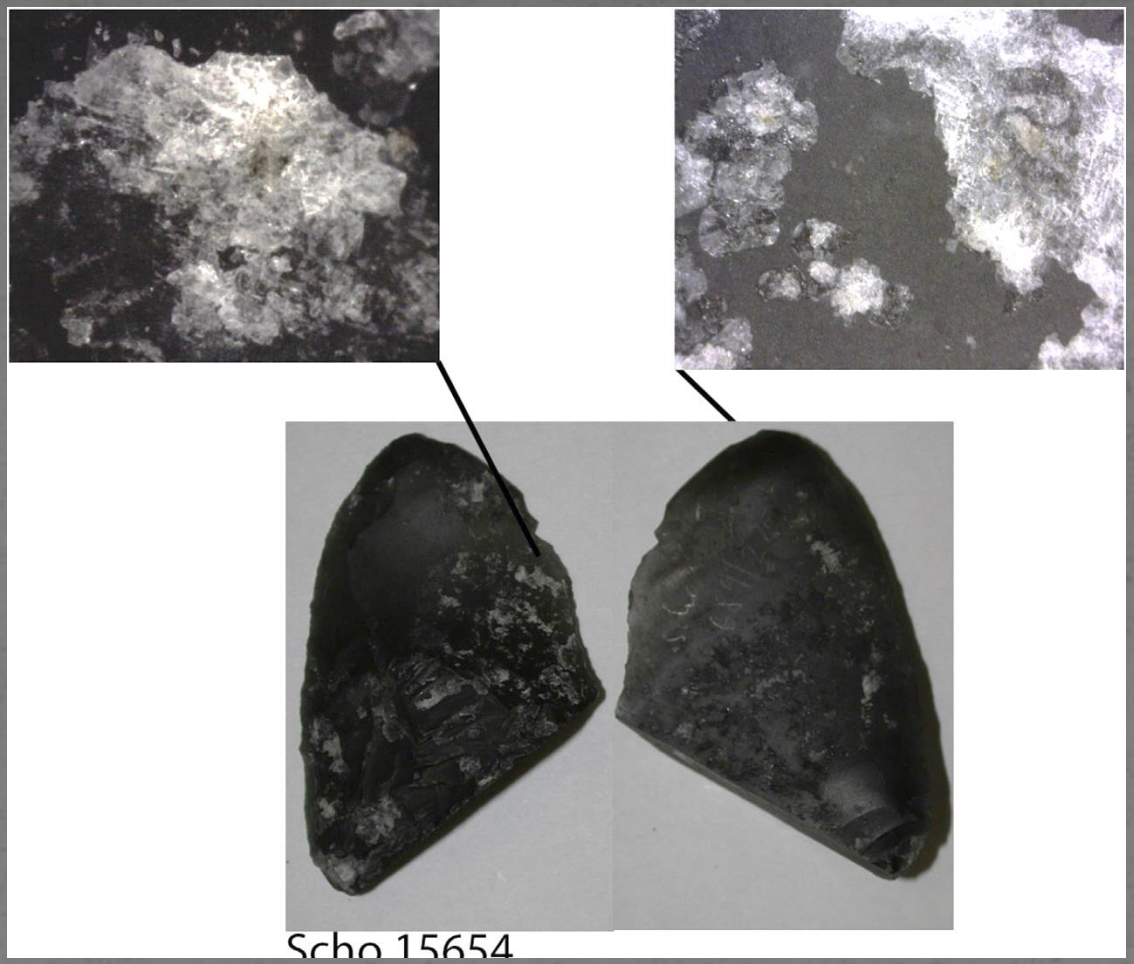

flint knapping
percussor
retoucher
multi-function
retoucher/
used tip
anvil/
retoucher?
butchering & soft material transformation
?
used tip
smoothed tip

Possible bone artifacts. Convex-smoothed tip elements, with detail of micro-wear observation showing parallel micro-striations. Note the similar size and shape of the blanks of the three specimens, likely chosen for their handiness.


1
2
3
4
5
6
7
8
0
5cm



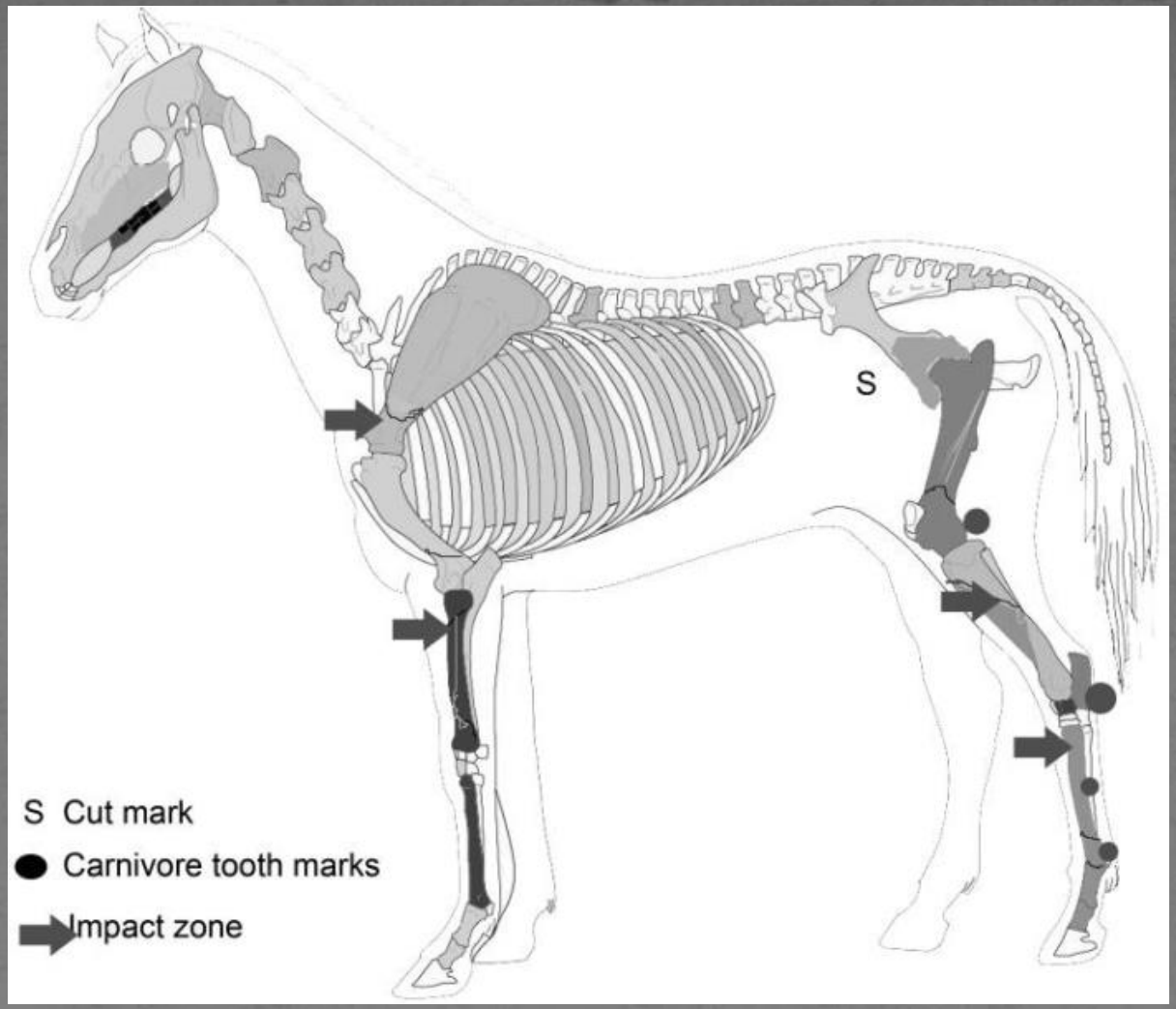
Macroscopic picture with wear evidence on ID18064: a) abrupt edge scarring from use on dorsal scraper-head (20X), b) possible hafting wear on ventral medial right edge (200X).



Macroscopic picture with residue evidence on ID15654: plant fragments interpreted as being due to a use in plant processing.

Lehringen, Germany, 125ky BP

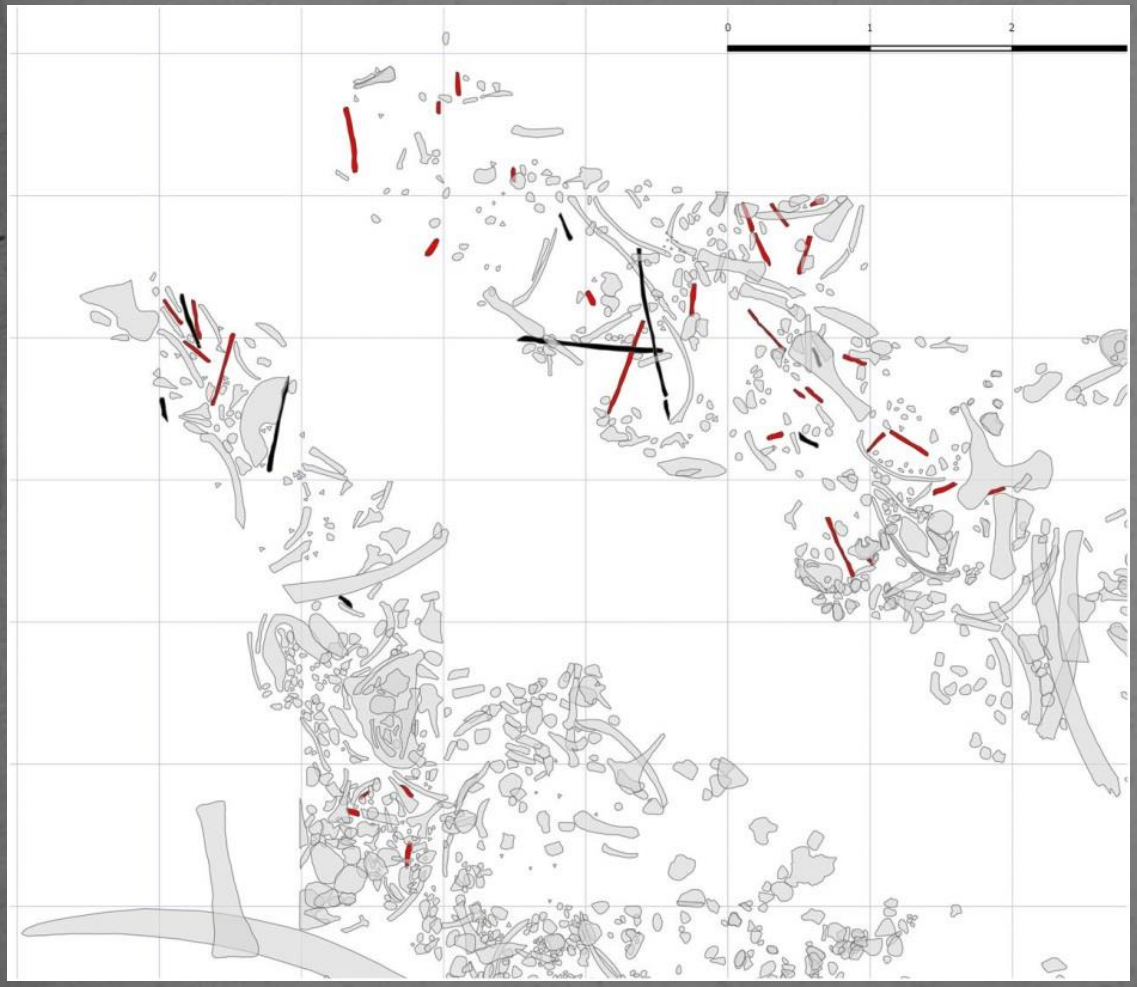
- **1 javelin fragmented found between the ribs of an elephant**
- **Associated with lithic tools**
- **Javelin 2.38 m long, pine wood finely worked**
- **The point is asymmetric and was hardened using fire**



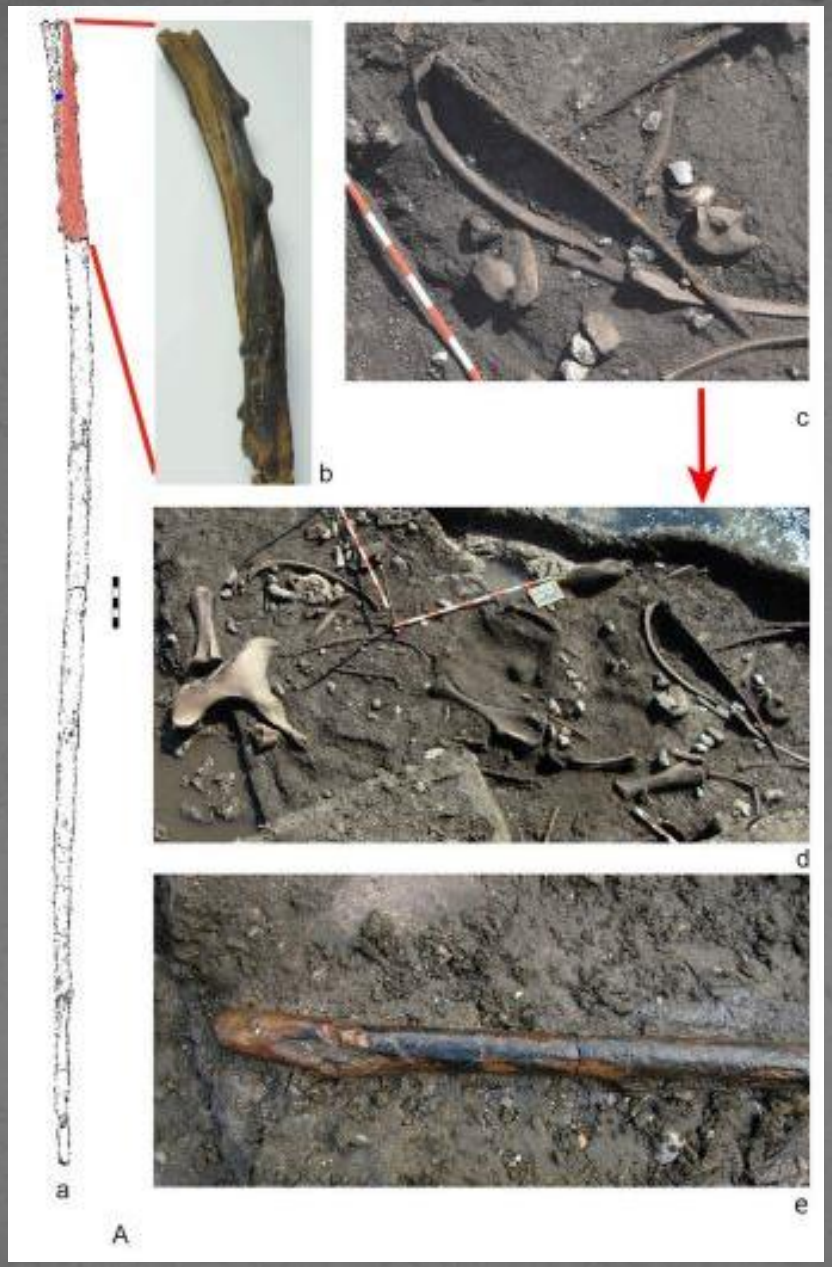
Anthropic action (cut marks and impact zones) and carnivore tooth marks on horse bones. The skeletal frequency is indicated by shades of gray (*dark gray*, high density).

Wooden tools and fire technology in the early Neanderthal site of Poggetti Vecchi (Italy)

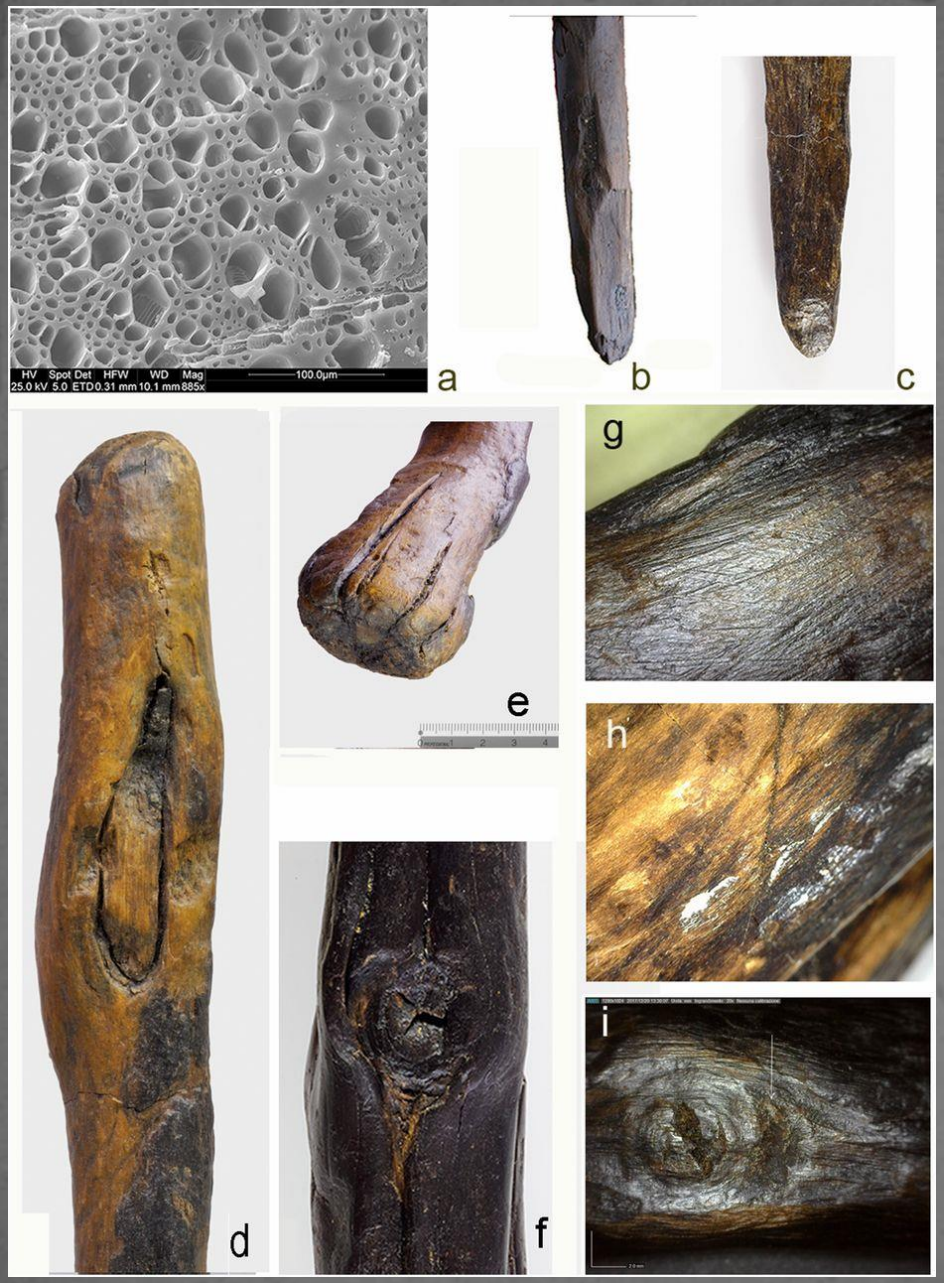
Biancamaria Aranguren[a,1], Anna Revedin[b], Nicola Amico[c], Fabio Cavulli[d], Gianna Giachi[e], Stefano Grimaldi[d], Nicola Macchioni[e], and Fabio Santaniello[d]



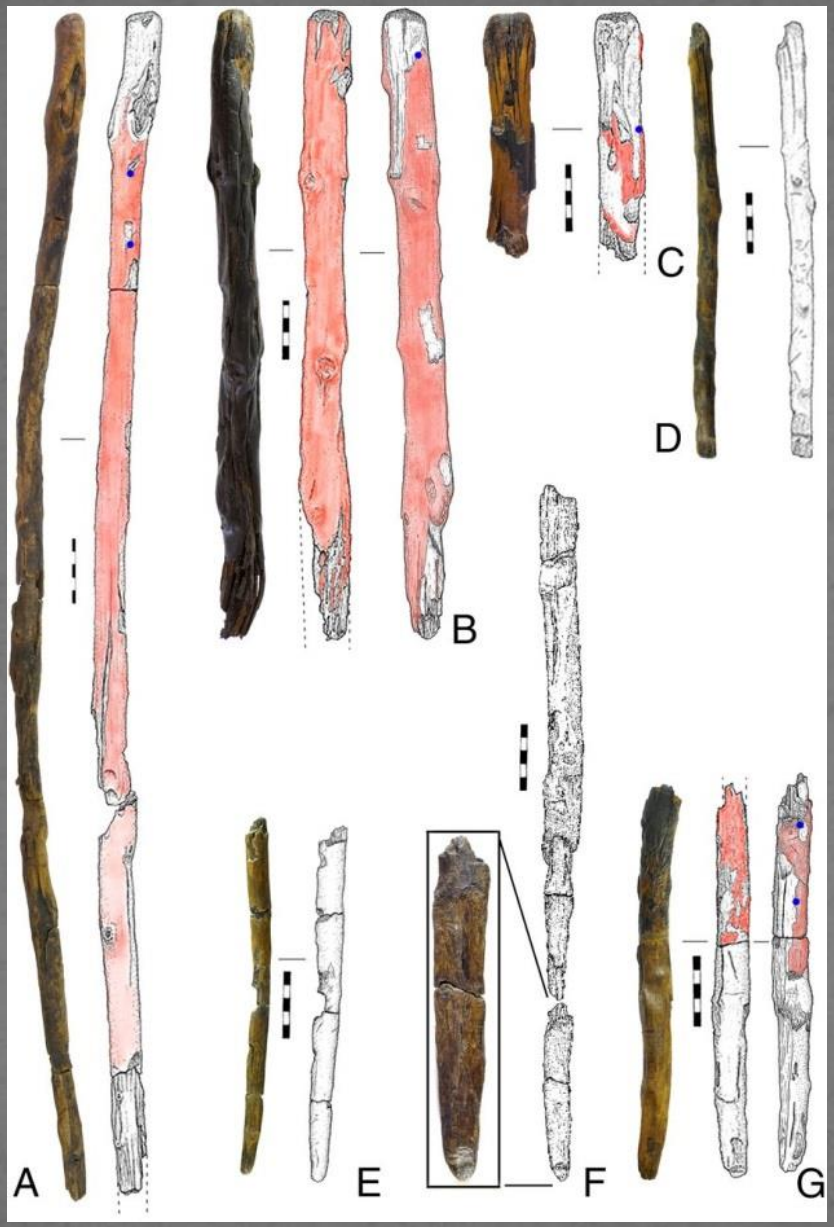
Poggetti Vecchi, U 2: details of the paleosurface divided by an erosion channel. The spatial distribution of wooden tools is shown; those charred are shown in black, those not charred are shown in red, and all of the other findings are shown in gray.



(A) Stick no. 11: drawing (a; charred part is shown in red, blue spots indicate measurements of film thickness); detail of the handle with prominent knots (b); the same stick on the paleosurface U 2 (c); and the same stick with the tip (d). (A, e) Stick no. 2 on the paleosurface.



(A) SEM image of the cross-section of the charred outer layer of one (49b) of the Poggetti Vecchi sticks made from *Boxus sempervirens*. The anatomical structure of boxwood is unchanged; however, with respect to fresh wood, the cell walls of its fibers and vessels are thinner, homogeneous, and compact despite the handmade fracture surface. This is the typical aspect of charred wood at SEM.
(B) Removal of a splinter starting from the tip of point no. 3+28.
(C) Notch on the tip of point no. 41.
(D) Detail of handle no. 2.
(E) Detail of handle no. 50.
(F) Detail of flattened knot of stick no. 9.
(G) Scratches on stick no. 14.
(H) Cut marks on stick no. 2.
(I) Cut marks located in the area of the knot on stick 33.



Poggetti Vecchi wooden tool drawings (charred parts are shown in red, blue spots indicate measurements of film thickness) and photographs. Handles: no. 2 (*A*), no. 9 (*B*), no. 50 (*C*), and no. 18 (*D*). Pointed tips: no. 55 (*E*), no. 41 (*F*), and no. 3+28 (*G*).

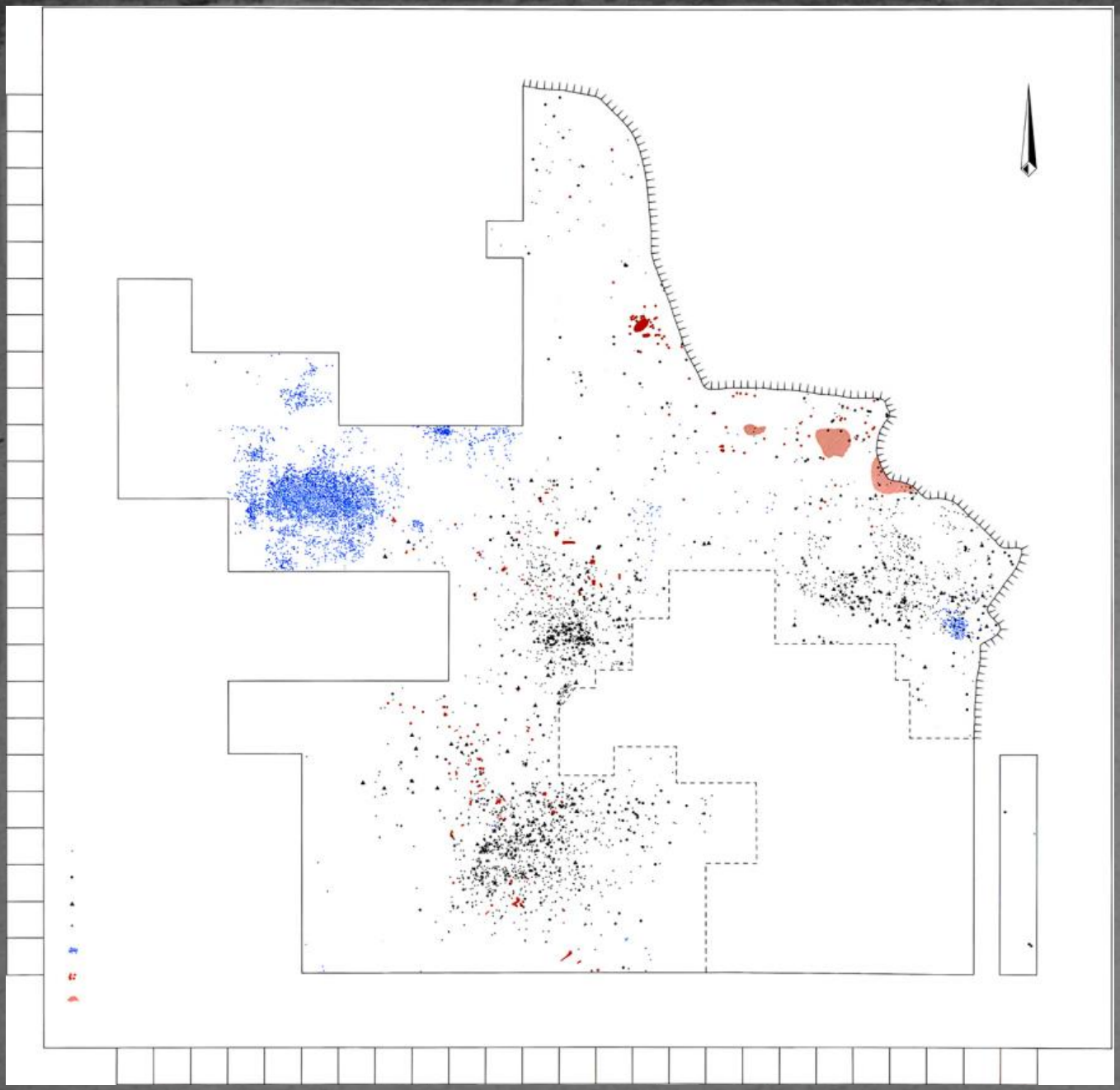
Australian “Waddy” in the Museum of Anthropology collection of Florence (inventory no. 8501). Traces of charring in the central part of the shaft are evident. The artifact is indicated as a hunting stick in the museum’s label: length of 103 cm, diameter between 3.5 and 4 cm, and weight of 825 g.

Use of red ochre by early Neandertals at Maastrich-Belvedere

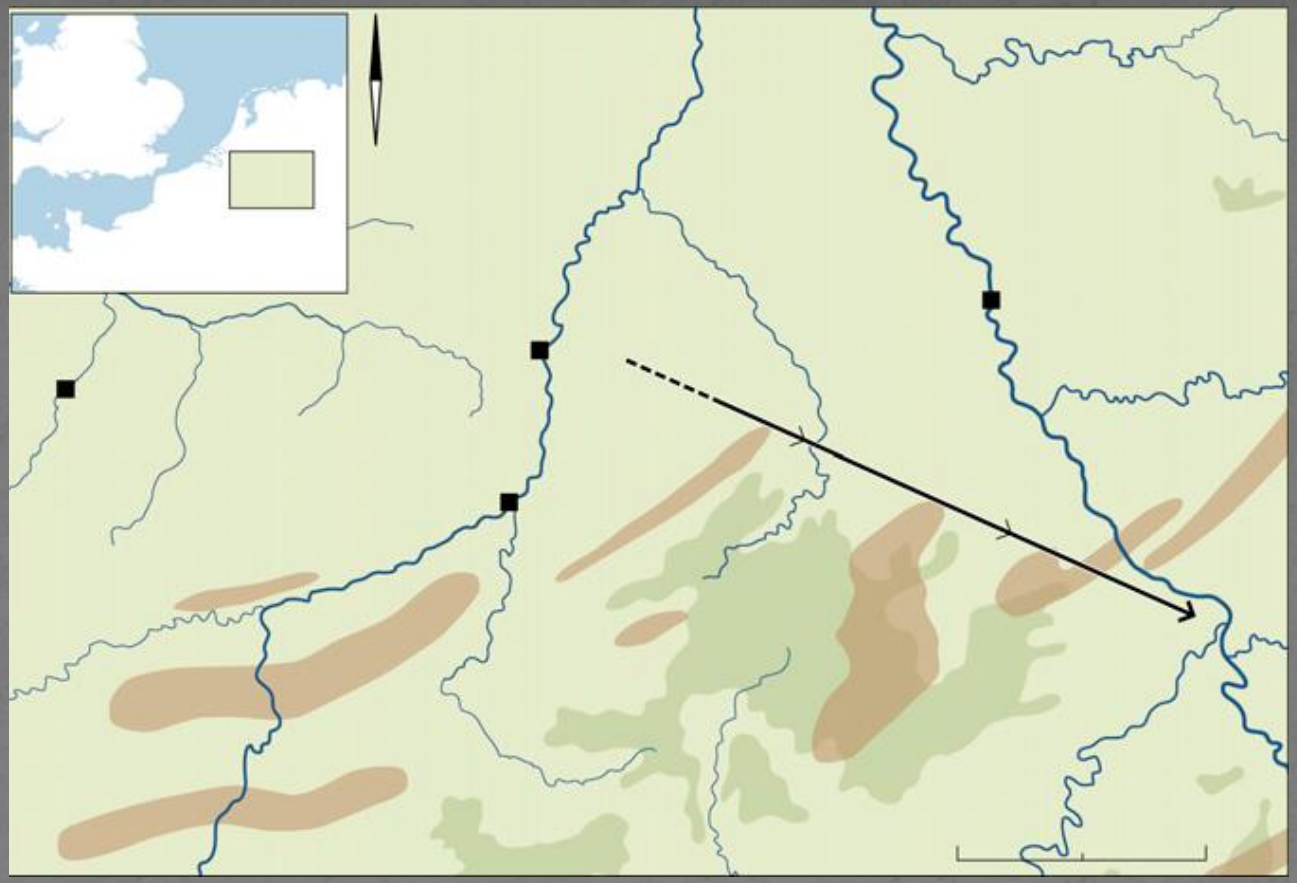
Wil Roebroeks

Site C, square Fz14, find Bv-894 during excavation, January 28, 1982. A flint flake can be seen next to the hematite concentrate.

The two largest hematite concentrates from site C at Maastricht-Belvédère.



Distribution map of the site C finds, showing the positions of the 15 hematite dots. Excavation squares coordinate grid is in meters. The southeastern part of the site, indicated in gray, was disturbed by karst.



Map indicating the location of Maastricht (-Belvédère) and the Ardennes iron ore sources (in red) of the Liège-Dinant-Namur area (1) as well as the Eifel sources (2, 3). The arrow indicates the transfer of flint artifacts from the Maastricht Cretaceous chalk area to the East Eifel sites of Wannen and Schweinskopf, as discussed in the text. Terrain >500 m above sea level is indicated in dark green.