

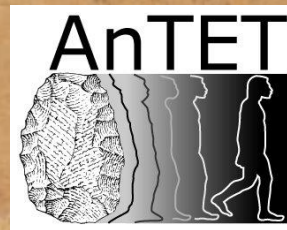
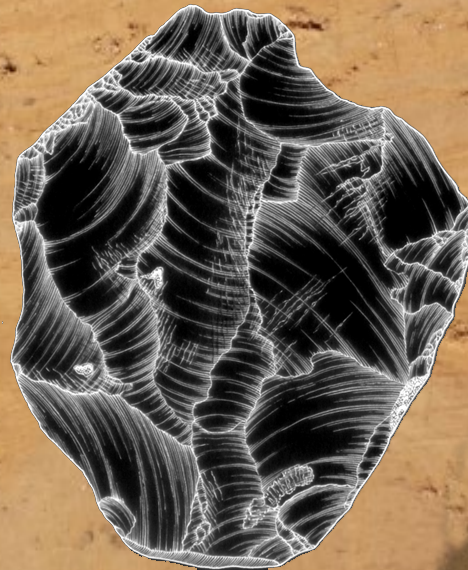
Middle Palaeolithic Lithic Technologies

David Hérisson

*CNRS-UMR7041 ArScAn, Equipe AnTET
Maison de l'Archéologie et de l'Ethnologie
Université Paris X Nanterre*



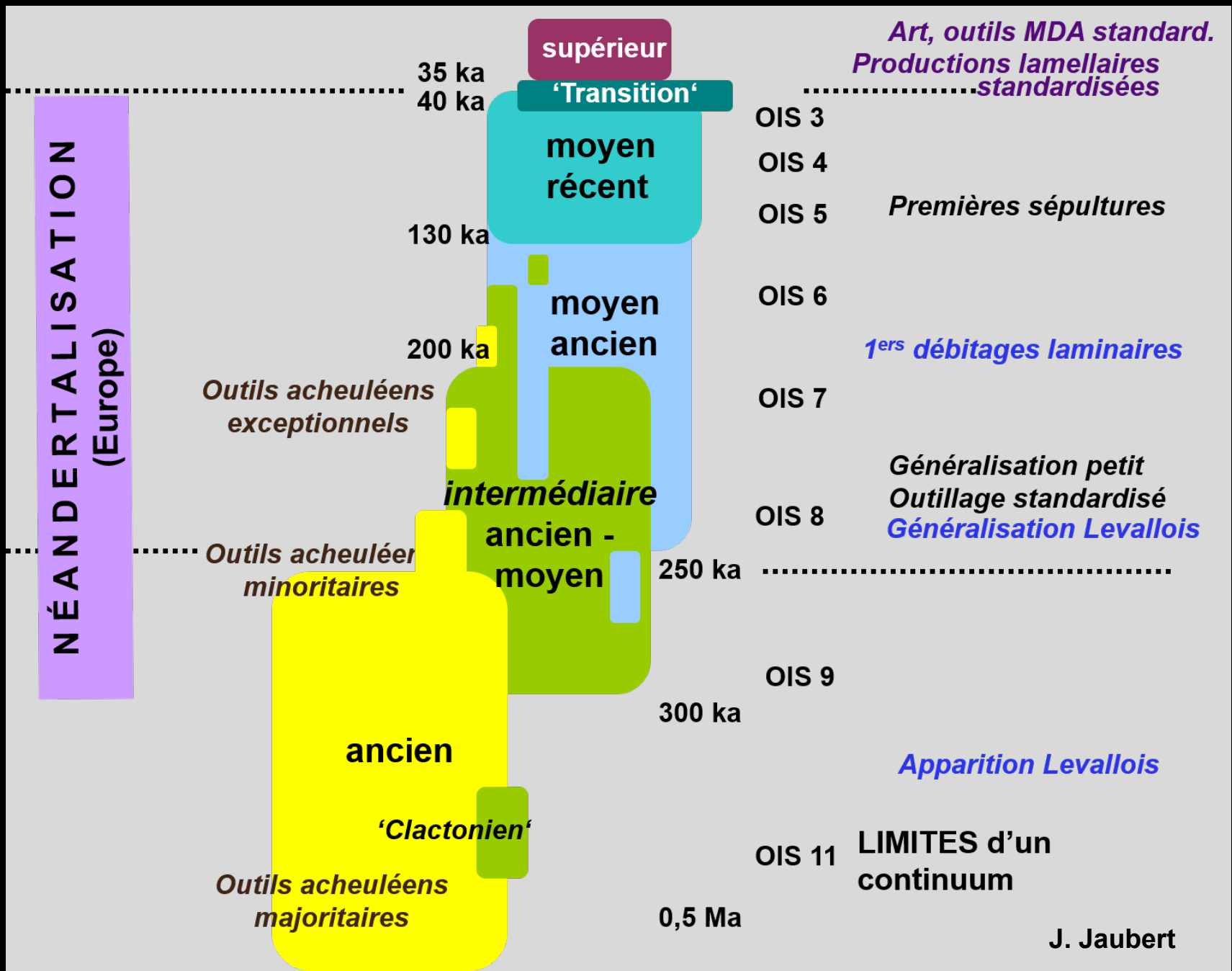
[@david_herisson](https://twitter.com/david_herisson)



Some words on Middle Palaeolithic...



Some words on Middle Palaeolithic...



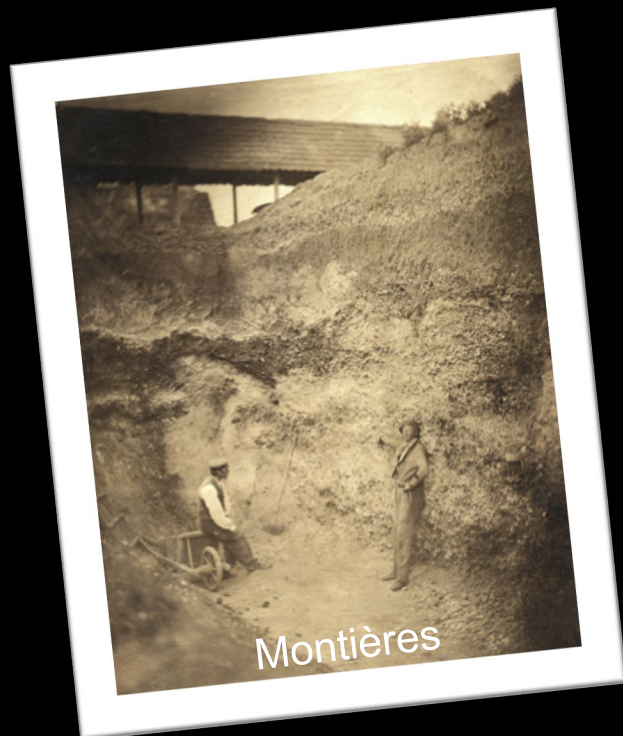
Historiography

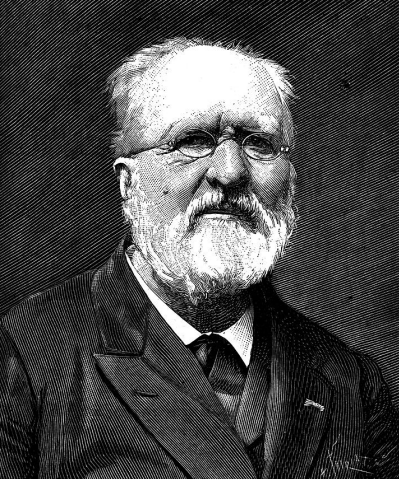
Before 1872 : pioneers' time

- 1808 : *Les Peyrards*, E. Requier
- 1815-16 : *Combe-Grenal*,
Pech de l'Azé F. Jouannet
- 1827 : *grotte Tournal*, Bize
F. Tournal
- 1831 : terrasses de la Somme
J. Boucher de Perthes
- 1865 : grottes de *La Chaise*
abbés Bourgeois et Delaunay

1861 - 1872 : the time of recognition

- 1863-64 : É. Lartet fouille au *Moustier* :
âge de Saint-Acheul et du Moustier
- 1867 : chronologie relative de
G. de Mortillet (M.A.N.)
- 1872 : *Classification des*
diverses périodes de l'Âge de la
Pierre : Mo(u)stérien





CLASSIFICATION

DES

DIVERSES PÉRIODES DE L'ÂGE DE LA PIERRE

2° Époque du Moustier, caractérisée par des pointes de pierre retaillées d'un seul côté (fig. 4) et par de grands racloirs (fig. 3). Le véritable grattoir fait défaut. L'industrie de cette époque se rencontre dans les alluvions quaternaires des bas niveaux, dans des brèches, des stations en plein air et des grottes ;

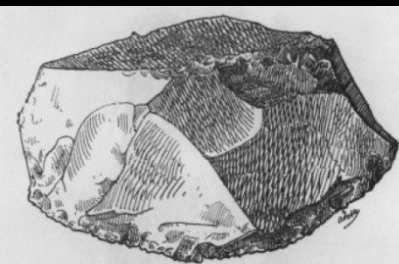


Fig. 3. Racloir en silex du Moustier.

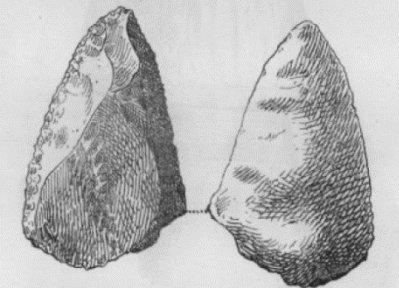


Fig. 4. Pointe en silex du Moustier.

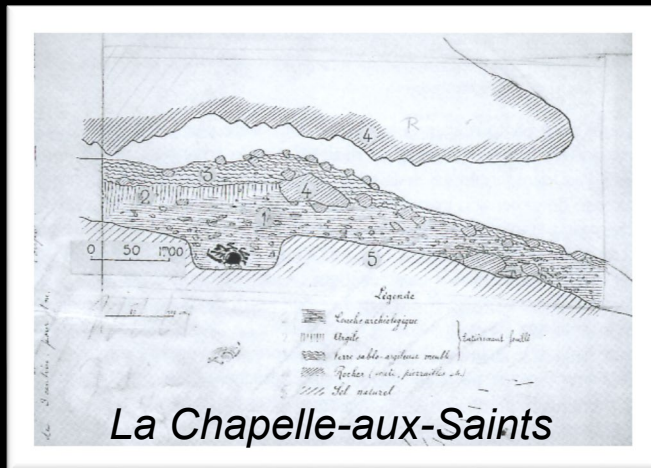
PIERRE TAILLÉE ARCHÉOLITHIQUE OU PALÉOLITHIQUE	INSTRUMENTS UNIQUEMENT EN PIERRE TAILLÉE	SOLUTRÉEN Époque de Solutré. TYPES : Pointes de silex en feuille de laurier taillées de deux côtés. Fig. 6 et 7.	Stations à l'air libre, abris et grottes : Solutré [Saône-et-Loire] ; Laugerie-Haute, Badegols, Saint-Martin d'Excideuil [Dordogne].	CLIMAT FROID ET SEC	Homme brachycéphale et mésati-céphale, se rapprochant de nos races actuelles. La Lesse, Cro-Magnon, Laugerie-Basse, Baoussé, Roussé, Solutré (partie).
		MOUSTIÉRIEN Époque du Moustier TYPES : Pointes de silex retaillées d'un seul côté et racloirs. Fig. 3 et 4.	Grottes et stations en plein air : Moustier [Dordogne] ; Chez-Pouré [Corrèze] ; la Martinière et l'Ermitage [Vienne] ; la Mère-Grand [Saône-et-Loire] ; Buoux [Vaucluse] ; Nérone [Ardèche] ; Goudenans-les-Moulins [Doubs] ; Cœuvres [Aisne] ; Brèches de Genay et Ménétreux-le-Pitois [Côte-d'Or] ; Alluvions des bas niveaux : Grenelle, Levallois, Clichy [Seine] ; le Pecq [Seine-et-Oise] ; Montguilain [Oise].	GLACIAIRE : CLIMAT FROID ET HUMIDE	Grand développement de l'ours des cavernes. Rhinocéros. Homme dolichocéphale, type assez inférieur. Engis, l'Omo.
		ACHEULÉEN Époque de Saint-Acheul. TYPES : Grands instruments de pierre en forme d'amande. Fig. 1.	Alluvions des hauts niveaux : Saint-Acheul, Abbeville, Thénac [Somme] ; Sotteville-les-Rouen [Seine-inférieure] ; Vaudricourt [Pas-de-Calais] ; San-Isidro [Madrid]. Plateaux : Beaumont [Vienne] ; Tilly [Allier] ; La Ganterie [Côtes-du-Nord] ; vallées de la Sausse et de la Ceillonne [Haute-Garonne].	PRÉGLACIAIRE : CLIMAT TEMPÉRÉ	Hippopotame. Eléphant antique. Homme, type le plus inférieur. Neanderthal, Eguisheim, la Naulette, Denise.

Historiography

1880 - 1915: the time of the glorious years

Multiplication of excavations and important discoveries:

- 1880 *Külna* (Tch.)
- 1895 *Krapina* (Croatie)
- 1905 *Le Moustier* (M. Boursin)
- 1908 *La Chapelle-aux-Saints*
- 1908-14 *abri inf du Moustier*
- 1909 Pech de l'Azé I
- 1909 et suivantes *La Ferrassie*
- 1909 *Abri Romani* (Esp) *Tata* (H)
- 1910-14 *El Castillo* (Esp)
- 1911 et suivantes *La Quina*
- 1913 Somme (V. Commont)
- 1916 « Micoquien » O. Hauser



After J. Jaubert, modified

Historiography

Between the two WW:

Emergence of new fieldworks

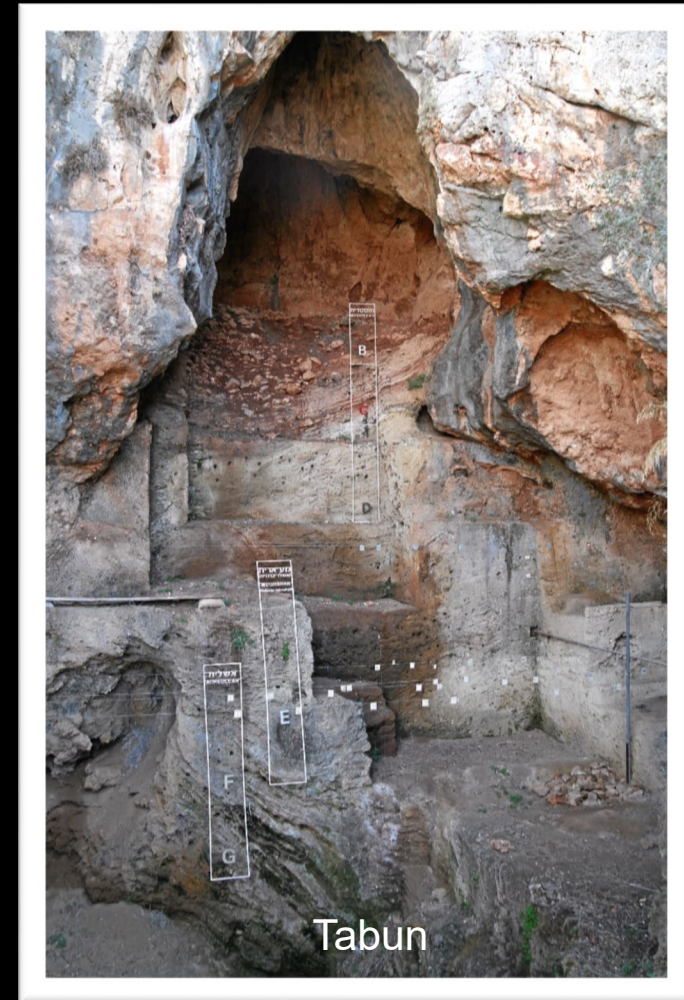
- ❑ Russie, Caucase, Asie Centrale
 - *Kiik Koba* (Crimée) Bonch-Osmolovski
 - *Teshik-Tash* (Uzb.) A.P. Okladnikov
- ❑ Moyen-Orient
 - *El Tabun* D. Garrod
 - *Es-Skhul* T.D. Mc Cown
 - *Qafzeh* R. Neuville et M. Stékélis

Excavation of numerous reference sites:

- *Mas-Viel* (46), *Mont-Dol* (35), *La Chaise* (16)
 - *Pech de l'Azé* (R.Vaufrey), *La Micoque* (D.Peyrony), *abri Chadourne*...
 - Publications D. Peyrony: *Le Moustier* (1930), *La Micoque* (1938)
- => Moustérien de tradition acheuléenne, Moustérien typique

New sites, eponym regions:

- Szélétien, 1937 (I.L. Cervinka), Pontinien, 1939 (A. Blanc, Italie)



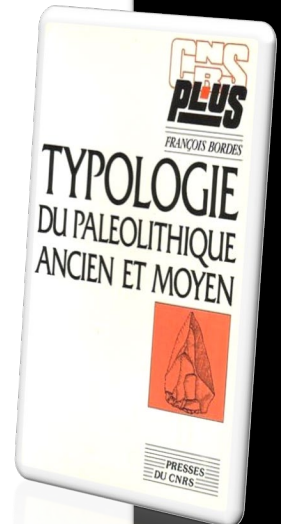
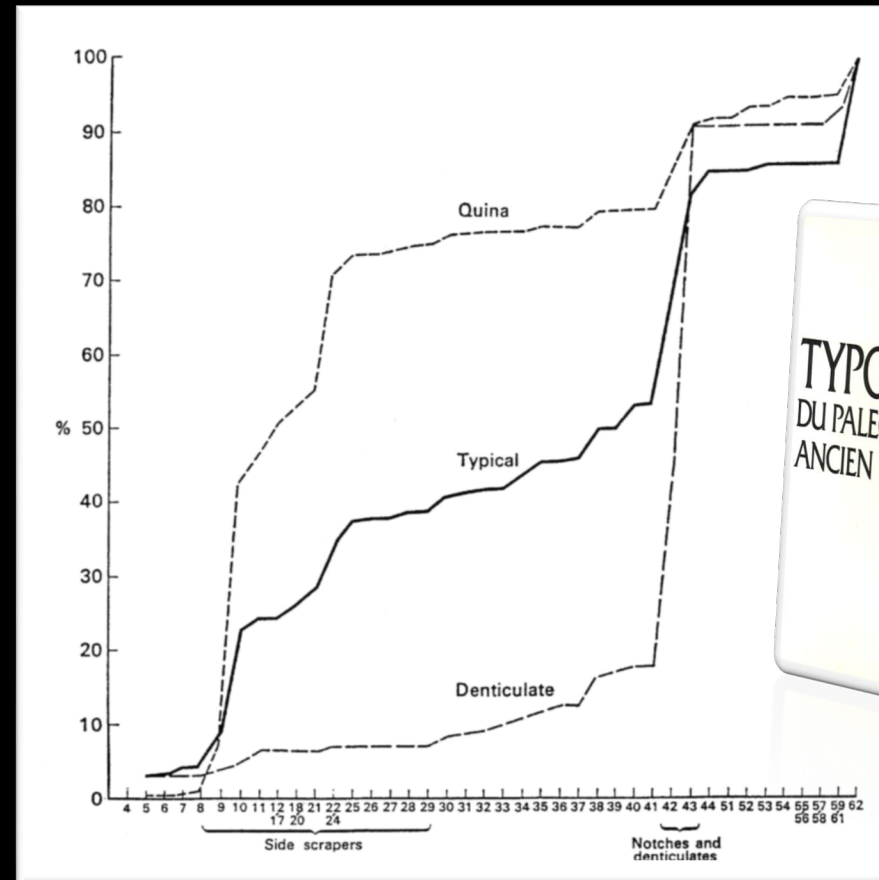
Historiography

50-60's : « méthode Bordes »

François Bordes
(1919-1981)



- *L'Anthropologie, Société préhistorique française*
- 1949 diagrammes cumulatifs Bordes
- 1950 : *Évolution buissonnante du Moustérien*
=> Charentien Quina, Ferrassie, Moustérien à denticulés
- 1950-52 *Pech Azé*
- 1953-65 *Combe-Grenal*
- 1953-65 *La Quina* (Henri-Martin)
- 1946-63 *Grottes d'Arcy*
- 1957 Sites méditerranéens H. de Lumley (*Les Peyrards, Hortus...*)



After J. Jaubert, modified

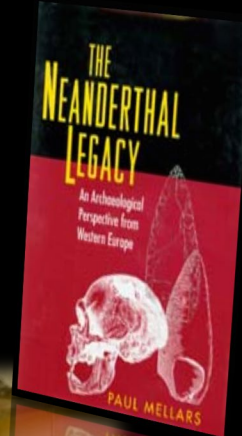
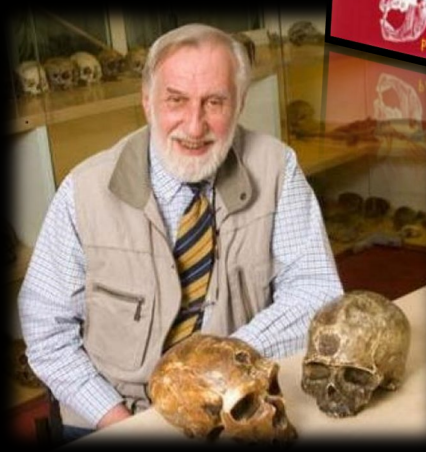
Historiography

60's: theories and polemics' time

1950-60 F. Bordes
'cultural' thesis



1965-69 P. Mellars
'chronological' thesis



1966 : S. & L.R. Binford
'functional' thesis



Historiography

70's: regional synthesis, monographs

- **Regional synthesis**

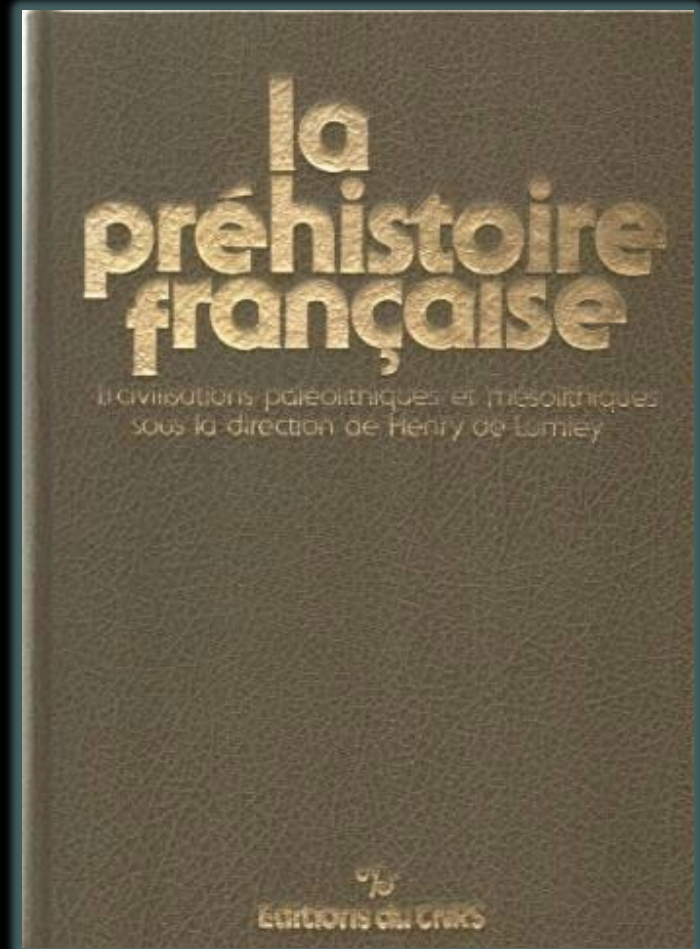
J. Combier (Ardèche),
J.-M. Le Tensorer (Agenais),
A. Debénath (Charente),
A. Tuffreau (Nord),
J.-L. Monnier (Bretagne)...

- **Monographs**

- *Le Lazaret*, 1969
- *Hortus* 1972
- UISPP Nice 1976

- **New interpretations (USA)**

- N. Rolland 1977
- H. Dibble 1984



Historiography

From 70's: methodological turning points...

...emergence of rescue archaeology...

Biache-Saint-Vaast (1976), A. Tuffreau dir.

1100 m² fouillés à la main



Historiography

From 70's: methodological turning points...

... palaeodosimetric datings ...

Martin Aitken (1922-2017)



Yuji Yokoyama



Hélène Valladas



TL

OSL

ESR

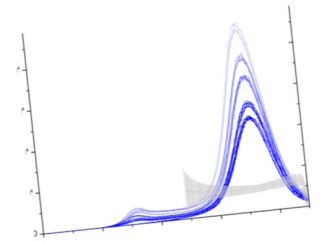
IRSL



U/Th

ESR-U/Th

RPE



Historiography

From 70's: methodological turning points...

...emergence of lithic technological approach

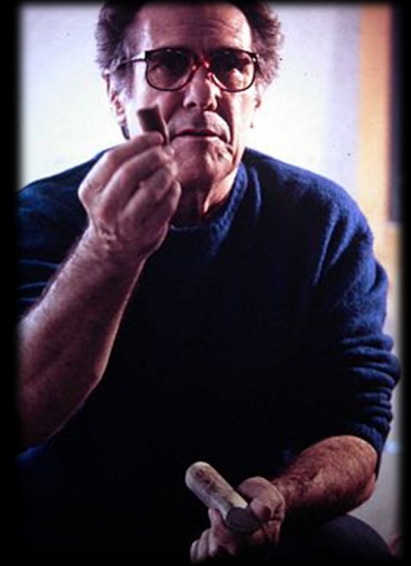
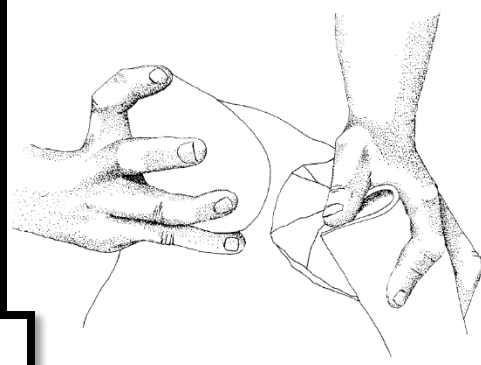
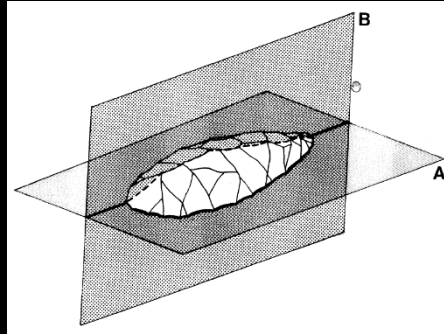
Technologie de la pierre taillée

M.-L. Inizan
M. Reduron
H. Roche
J. Tixier

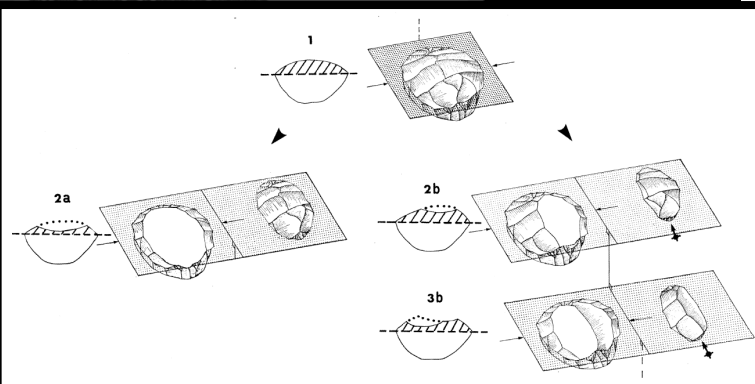


CREP

publié avec le concours
du Centre National de la Recherche Scientifique
et de l'Université de Paris X Nanterre



Jacques Tixier
(1925-2018) & al.



E. Boëda. *Le concept Levallois :
variabilité des méthodes*, 1994.

Middle Palaeolithic Lithic Technologies

Diversity of Lithic Production Systems During the Middle Paleolithic in France

Are There Any Chronological Trends?

Anne Delagnes

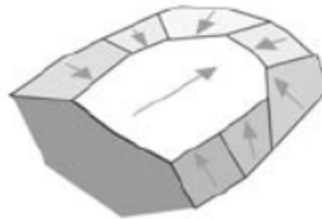
Institut de Préhistoire et de Géologie du Quaternaire UMR 5199-PACEA/Université Bordeaux I
FRANCE a.delagnes@ipq.u-bordeaux1.fr

Liliane Meignen

C.N.R.S./CEPAM, Sophia Antipolis, Valbonne FRANCE meignen@cepam.cnrs.fr

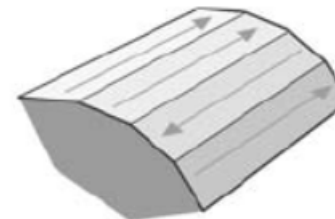
①

Preferential method

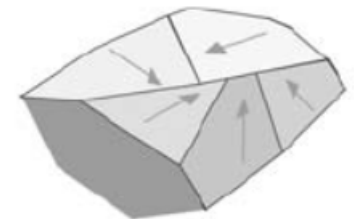


Levallois debitage

Recurrent uni/bidirectionnal method

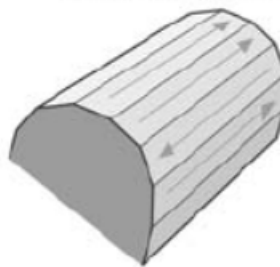


Recurrent centripetal method

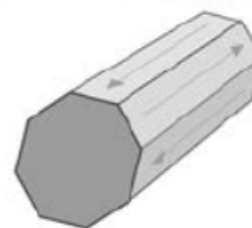


Laminar debitage

Semi-rotating method



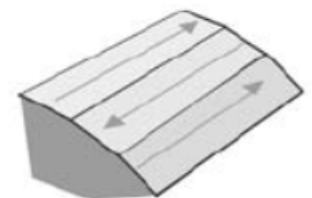
Rotating method



Frontal method



Facial method

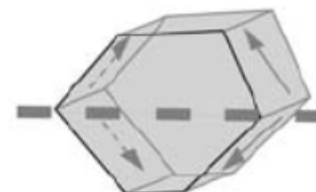


②

Levallois debitage



Discoidal debitage

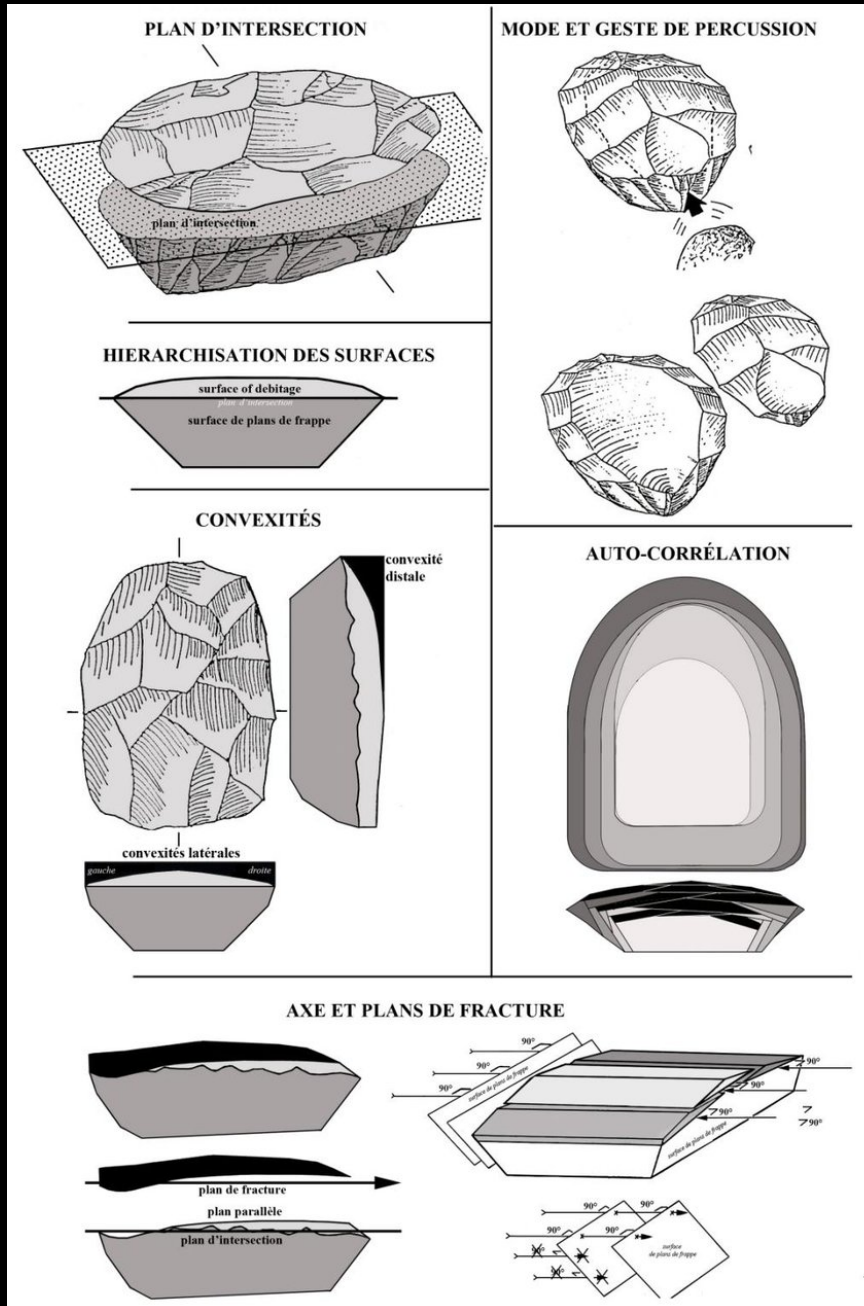


Quina debitage



Levallois concept

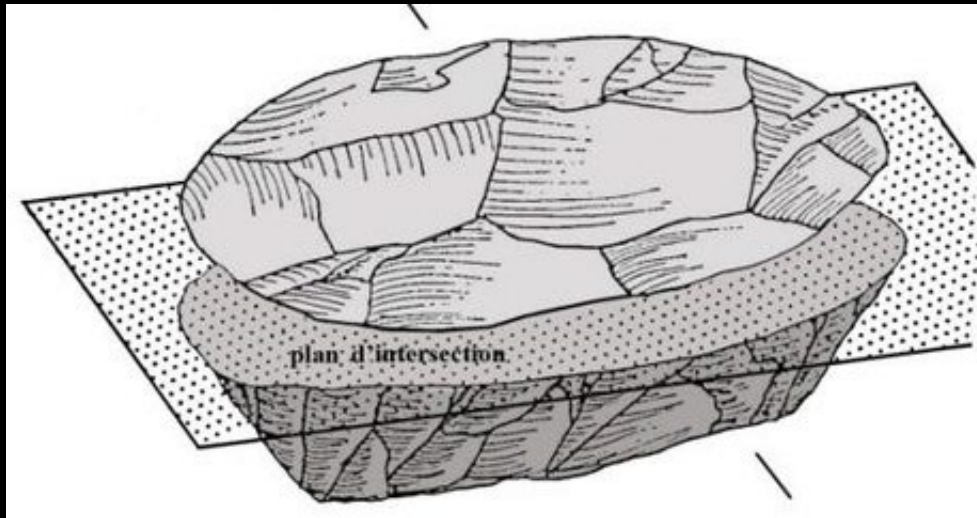
Levallois concept



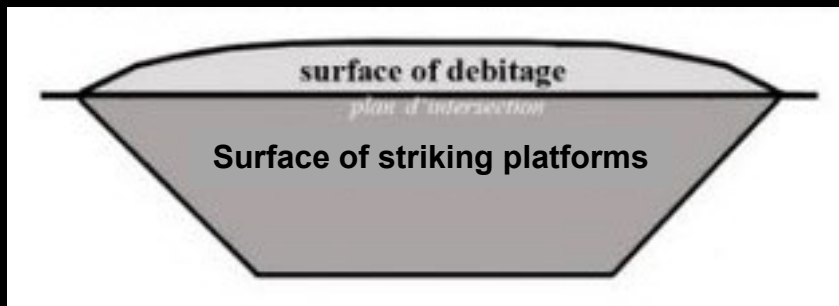
Boëda, 1994, Boëda, 2013

Levallois concept

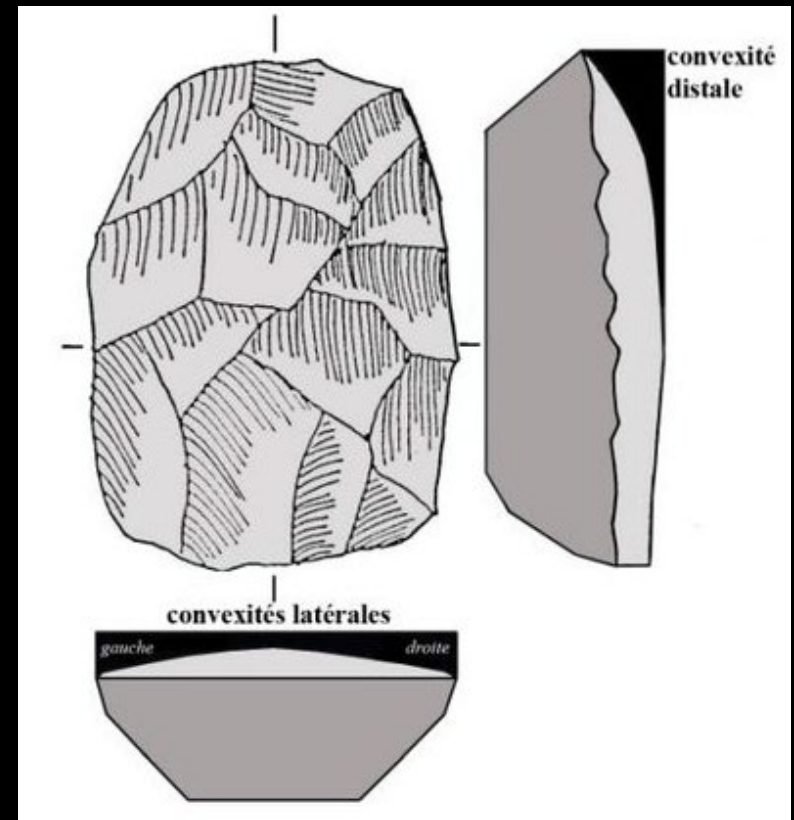
Criterion 1: plane of intersection



Criterion 2: hierarchically related surfaces

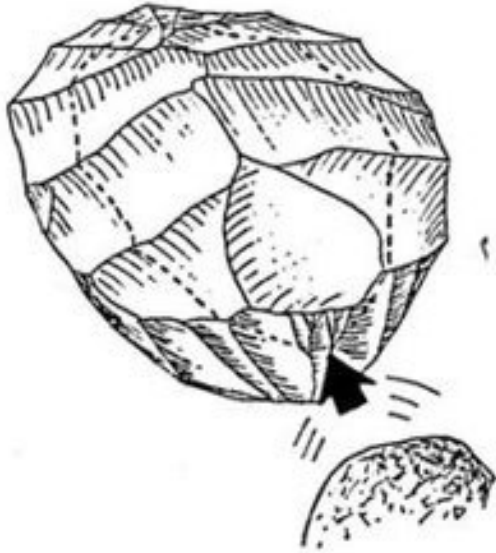


Criterion 3: predetermination with lateral and distal convexities

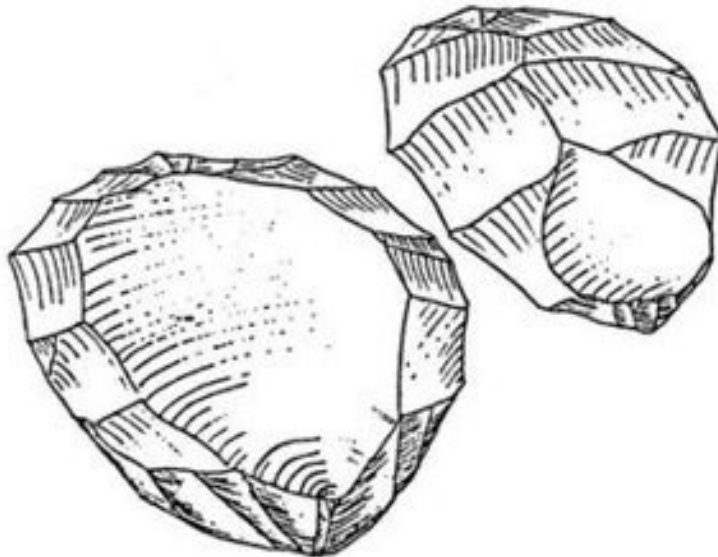


Levallois concept

MODE ET GESTE DE PERCUSSION



**Criterion 4: direct,
hard hammer percussion**

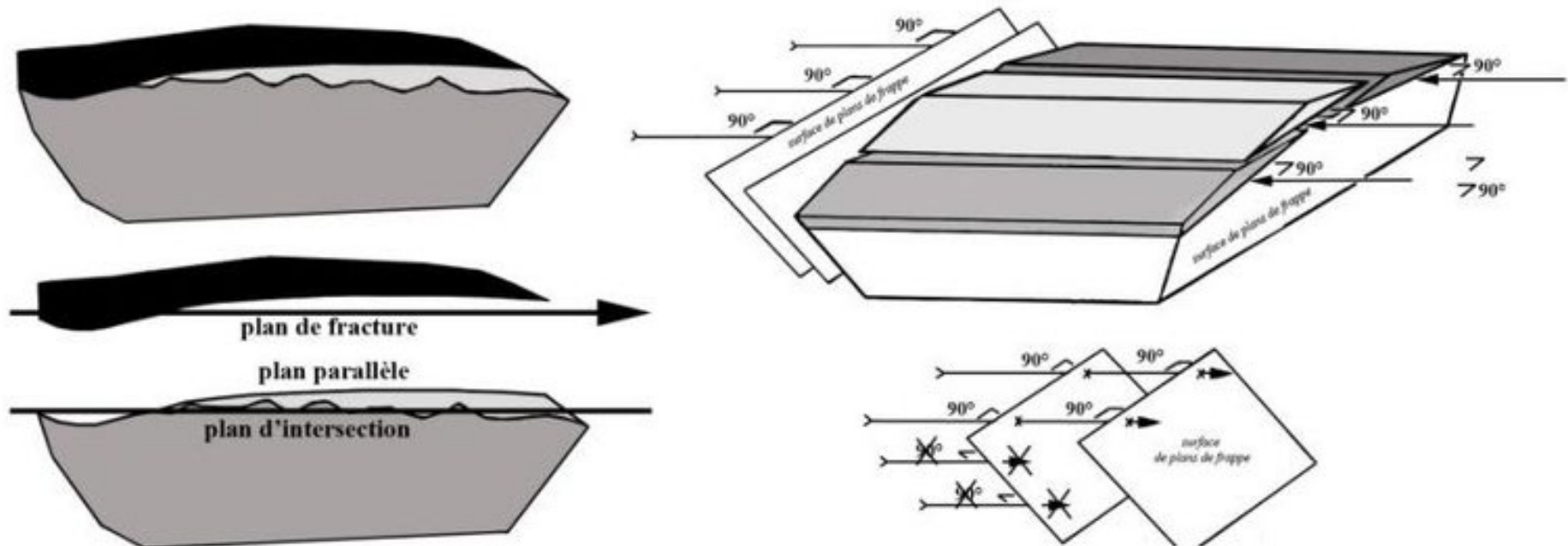


Boëda, 1994,
Boëda, 2013

Levallois concept

Criterion 5: axes of percussion are perpendicular to the hinge

AXE ET PLANS DE FRACTURE



Levallois concept

AUTO-CORRÉLATION



Criterion 6: auto-correlation

allows to:

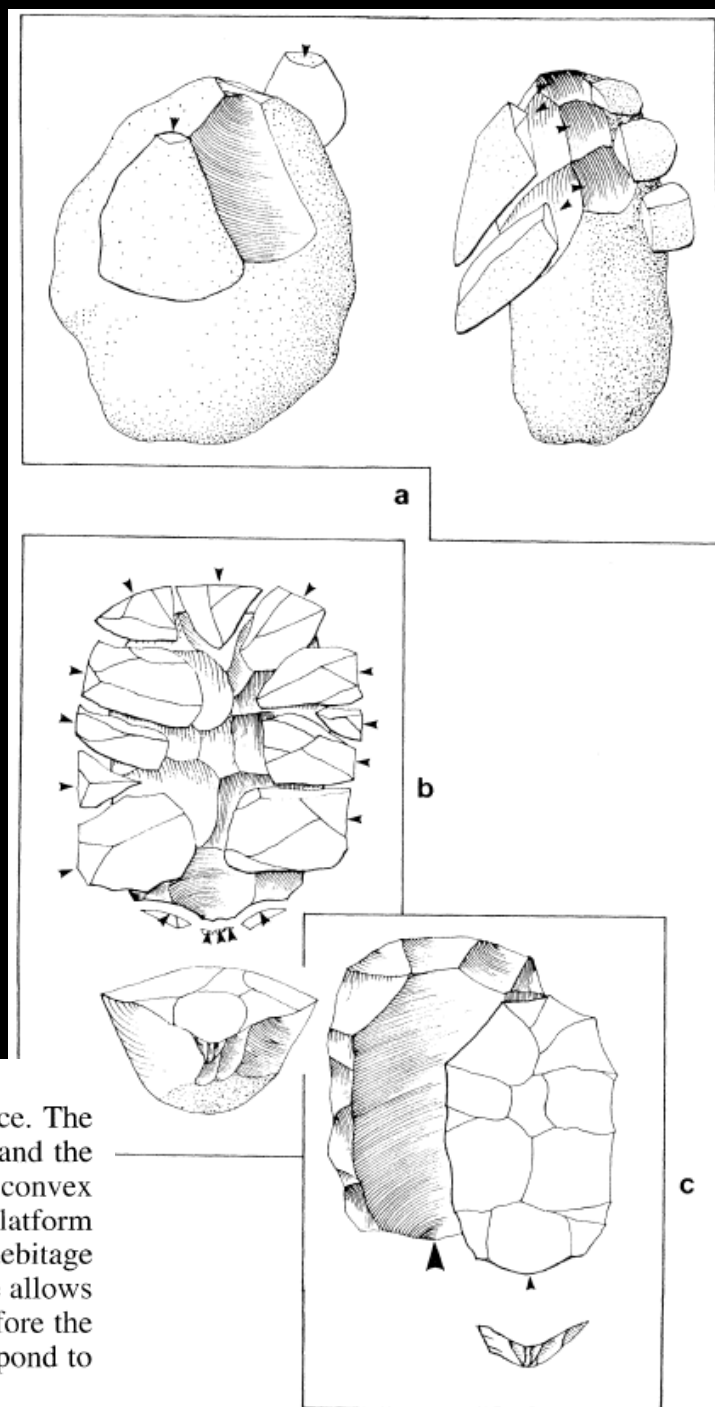
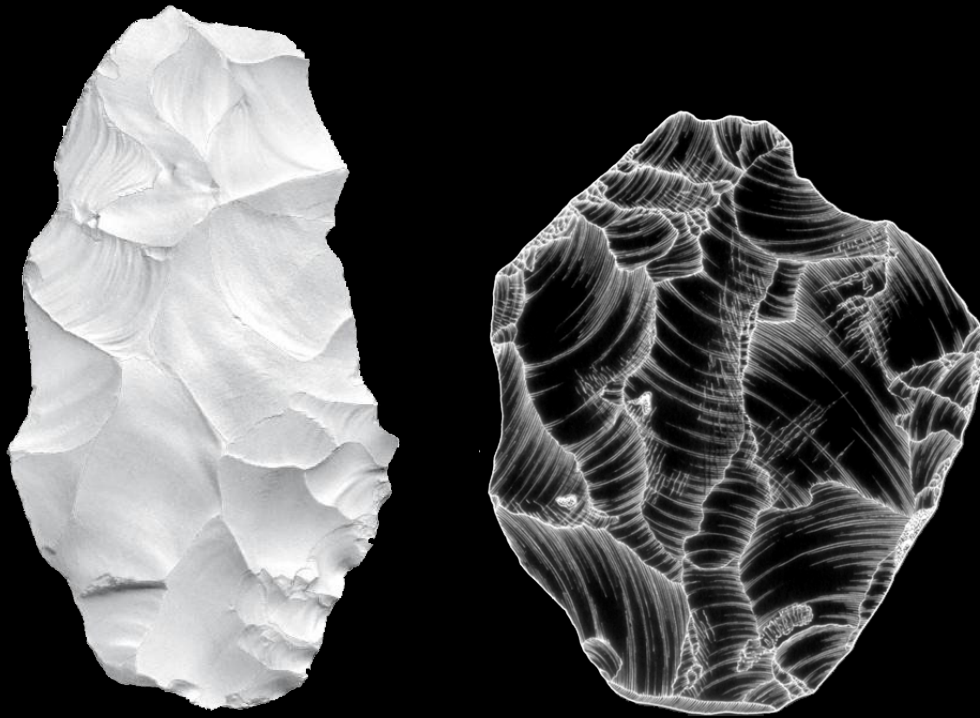
- correct the accidents during the production phase
- maintain the predetermination criteria

After Boëda, 2013

Levallois methods

Method of initialisation: centripetal

Method of production: preferential



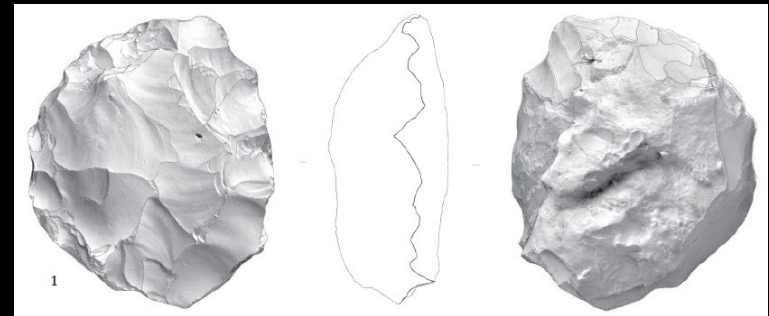
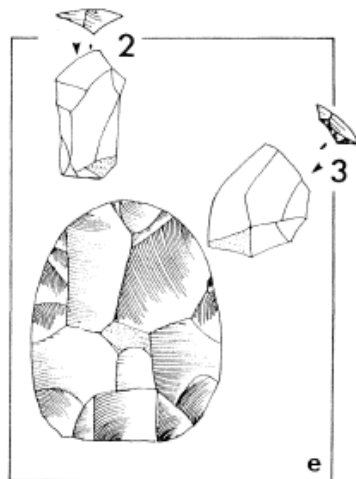
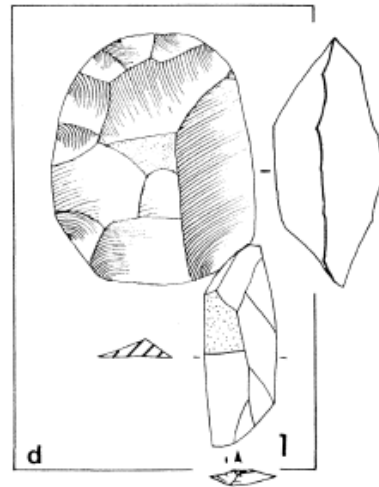
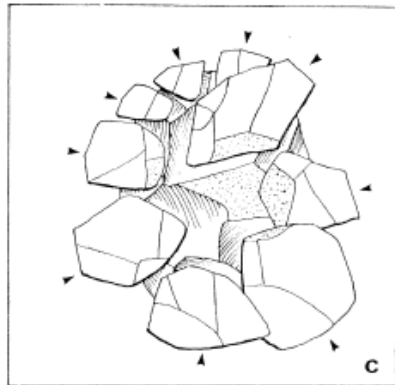
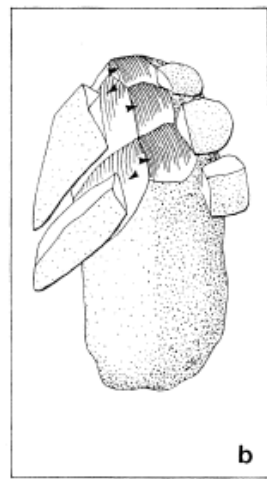
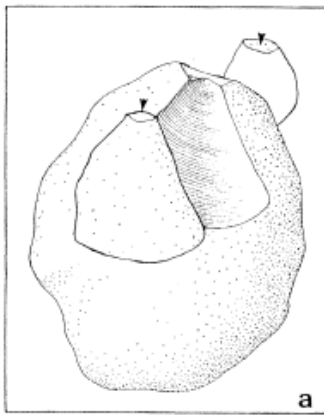
- Levallois debitage of a preferential flake (fig. 22 : 2a, fig. 23 and fig. 26 : 1)

The aim is the manufacture of a single flake from each prepared debitage surface. The butt of the flake is small relative to the total surface that is in principle planned for it, and the flake spans most of the debitage surface. Figure 23a shows the creation of the two convex surfaces by means of centripetal removals, 23b showing the preparation of the striking platform (also carried out by means of centripetal removals) and the final shaping out of the debitage surface. In 23c, the Levallois flake removal operation is shown. If the volume of the core allows the manufacture of another flake, the entire process must be gone through once again before the second flake is removed. When within a single assemblage the products obtained correspond to a single flake for each prepared surface, the method is referred to as “lineal”.

Levallois methods

Method of initialisation: centripetal

Method of production: recurrent centripetal



0 5cm

3. Recurrent centripetal Levallois method (fig. 24)

The margin of the entire surface selected as the striking platform can be used, but confusion must be avoided with discoidal debitage : the specifically Levallois character of the method lies in the debitage surface being exploited in such a way as to ensure that it remains always in the same debitage plane.

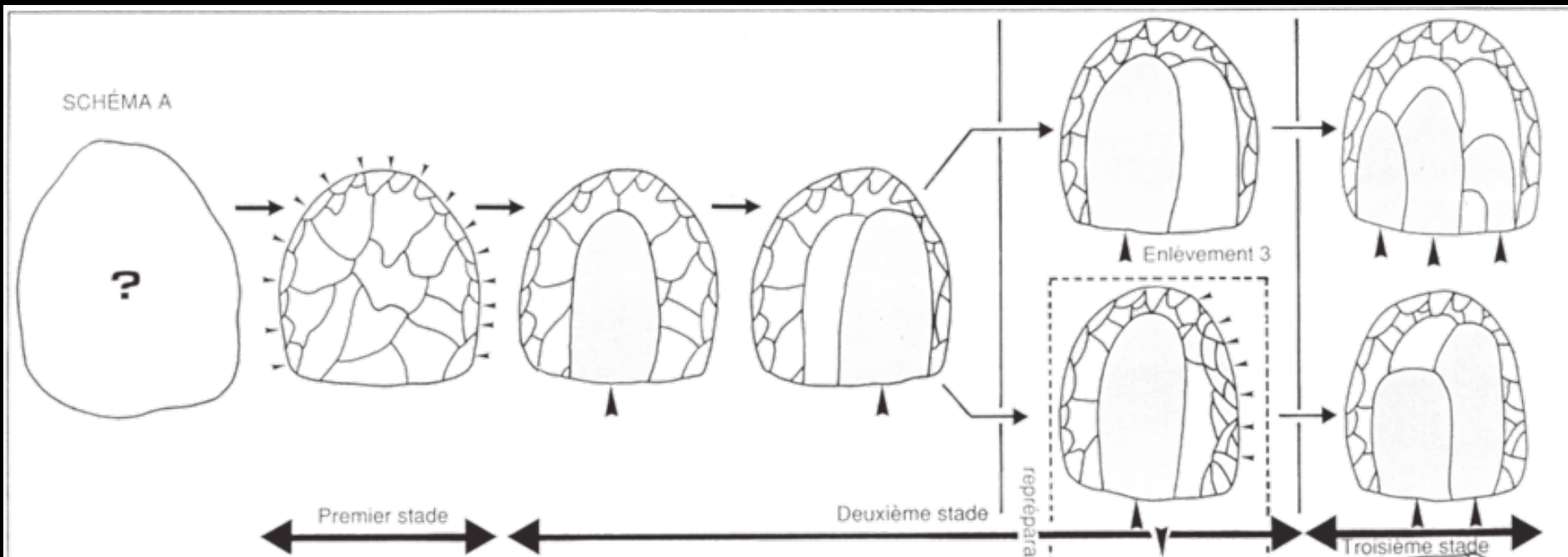
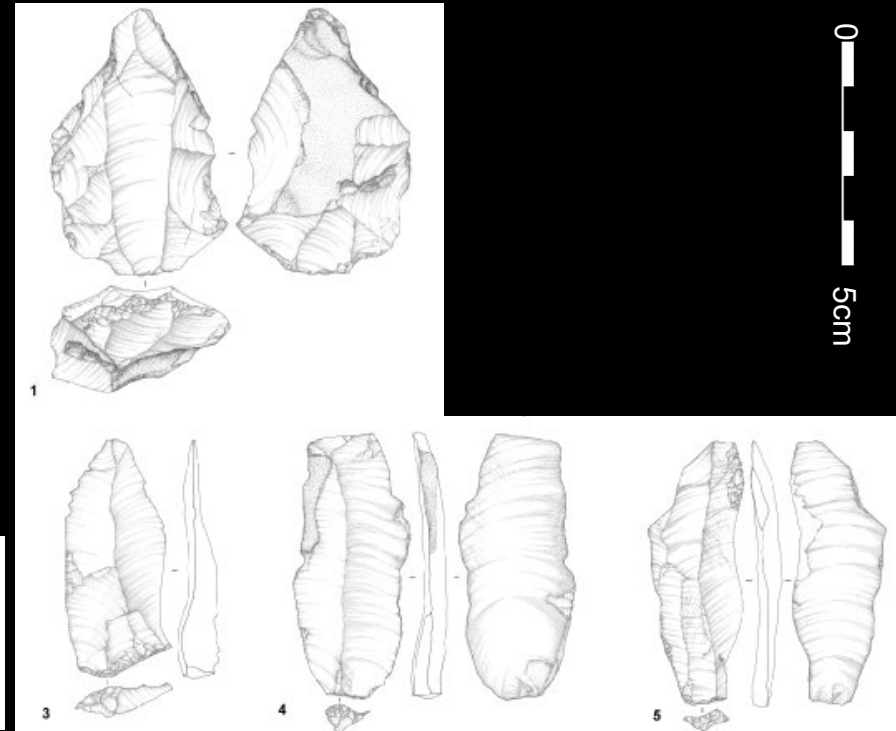
Levallois methods

Method of initialisation: centripetal

**Method of production: recurrent
unipolar**

1. Recurrent unipolar Levallois method

The flakes have a single direction of removal, and tend to be elongated. The striking platform is small. If the directions of the removals converge slightly, the flakes will be triangular in shape. Levallois points often proceed from this type of knapping scheme, and more rarely from bipolar preparation. Such a method is documented in the Sudano-Egyptian region⁶⁴ and in the Near East⁶⁵ for instance (fig. 26 : 2).



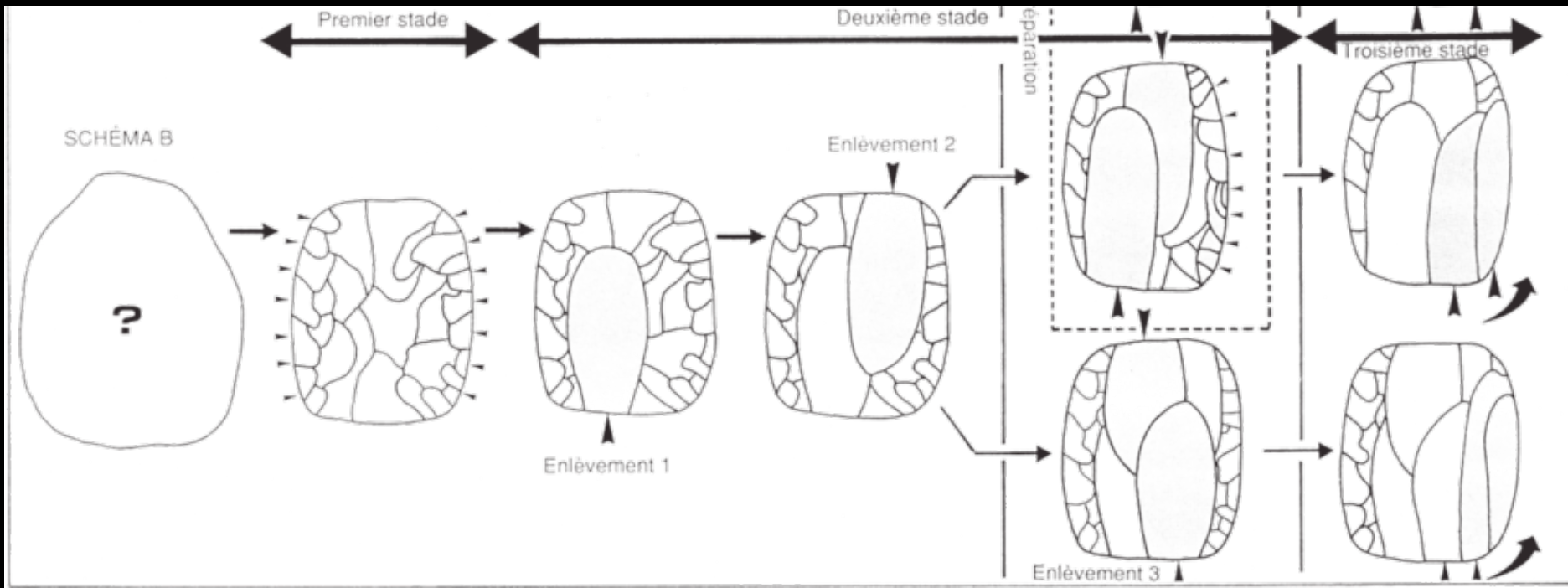
Levallois methods

Method of initialisation: centripetal
Method of production: recurrent bipolar



2. Recurrent bipolar Levallois method (fig. 22 : 4b)

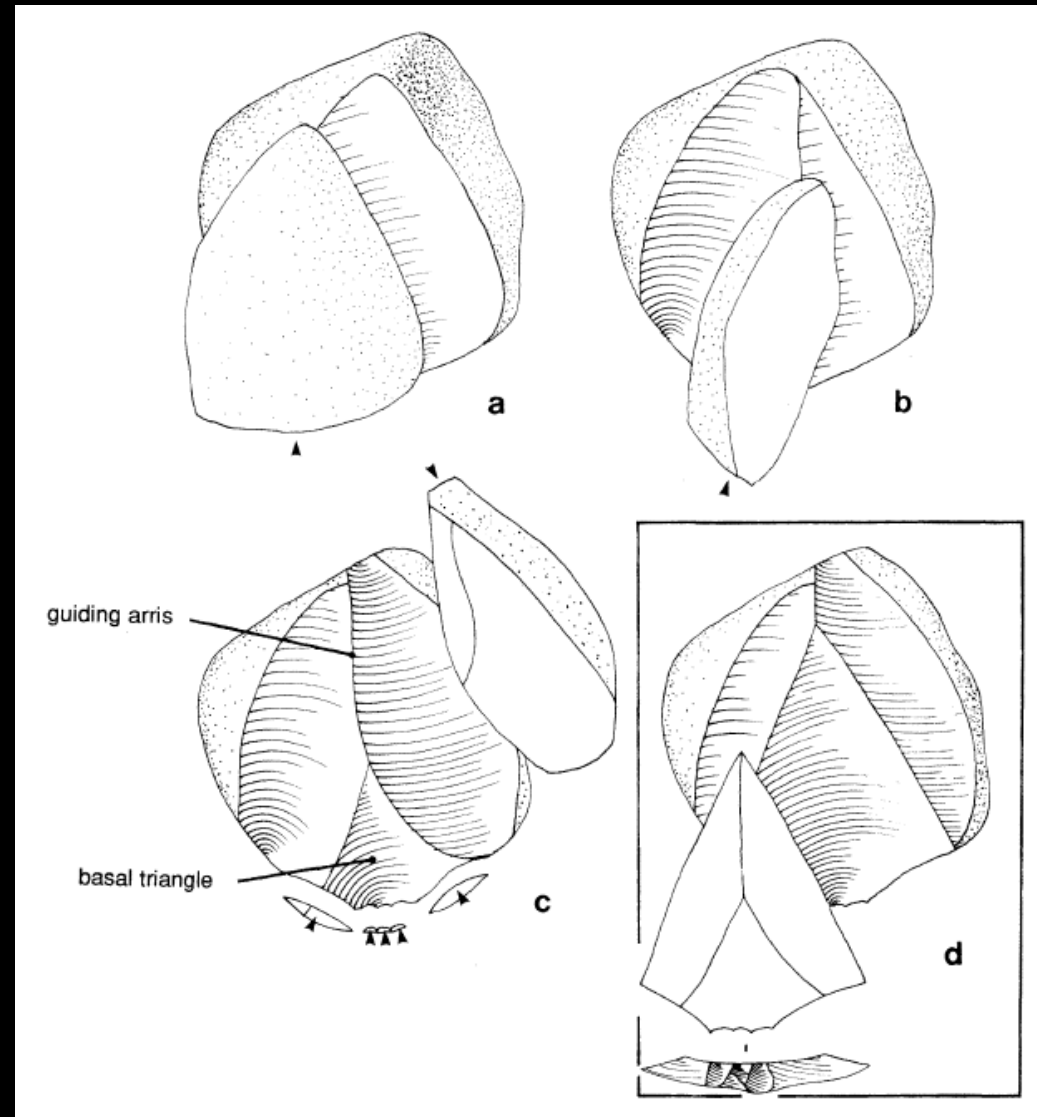
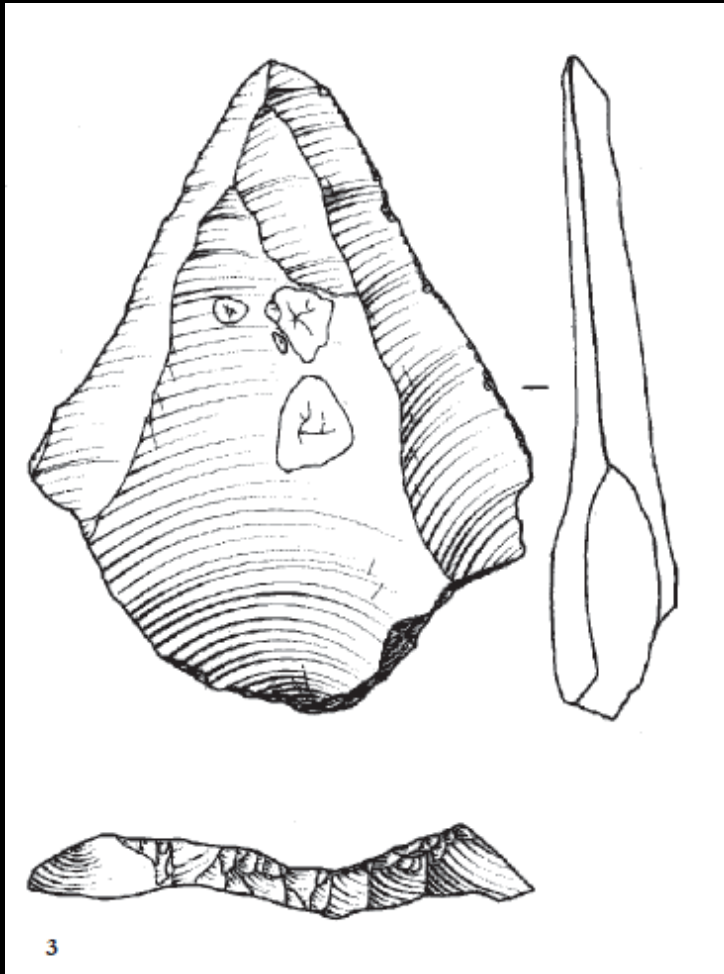
Flakes that originate from two opposed preferential striking platforms can be observed, the direction of removal being visible on the upper faces of the flakes. Levallois blades are traditionally achieved by means of such a method: it can be noted that in Levallois blade debitage, the ridges created by the intersection of the two convex surfaces do not serve as a crested blade (see under : blade debitage).



Levallois methods

Method of initialisation: unipolar convergent

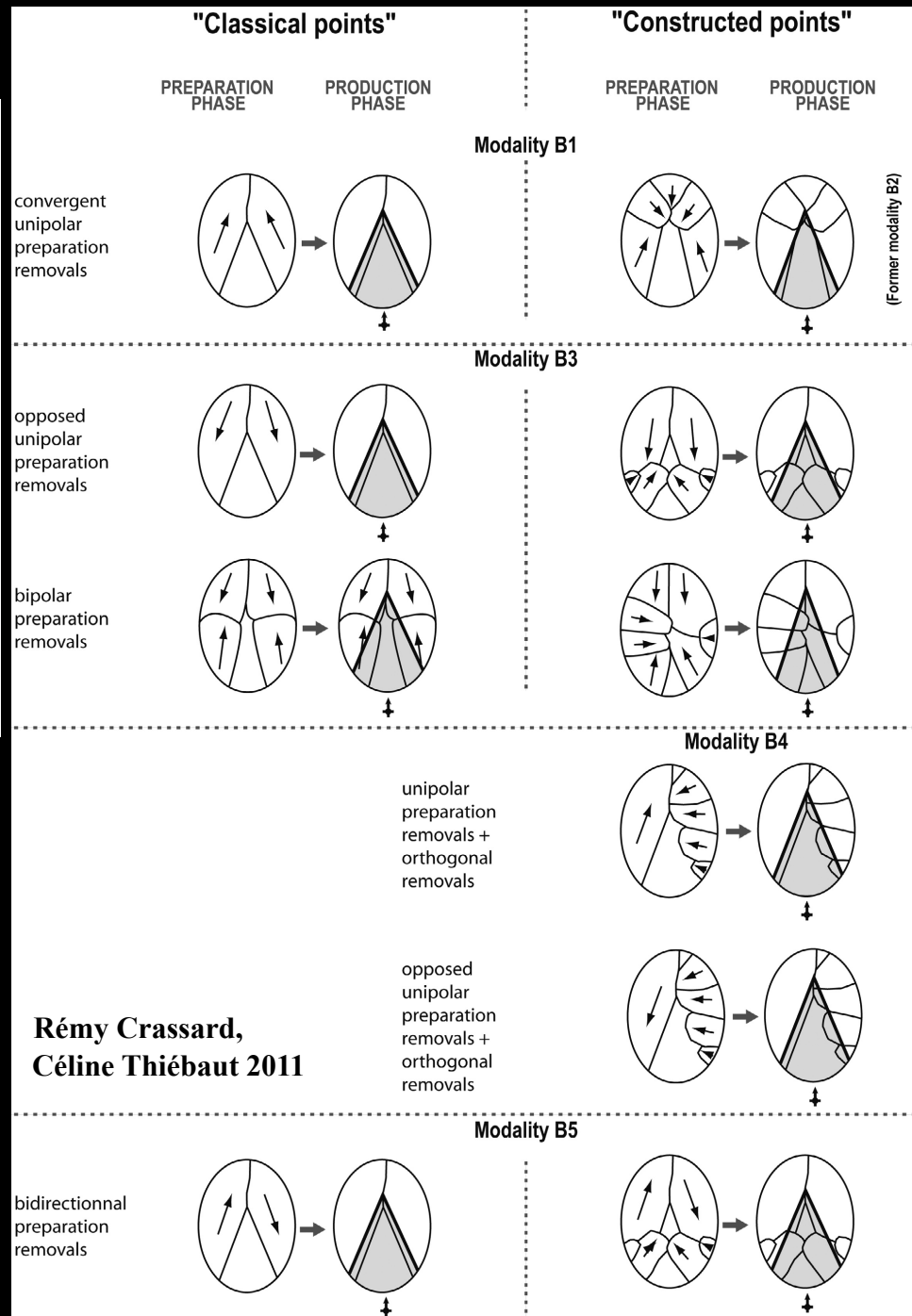
Method of production: preferential



Levallois methods



0 10cm



Rémy Crassard,
Céline Thiébaud 2011

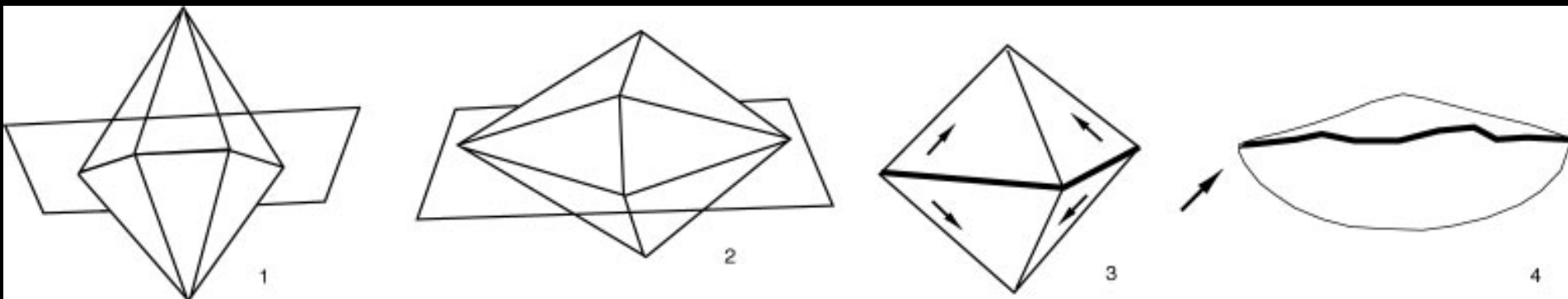
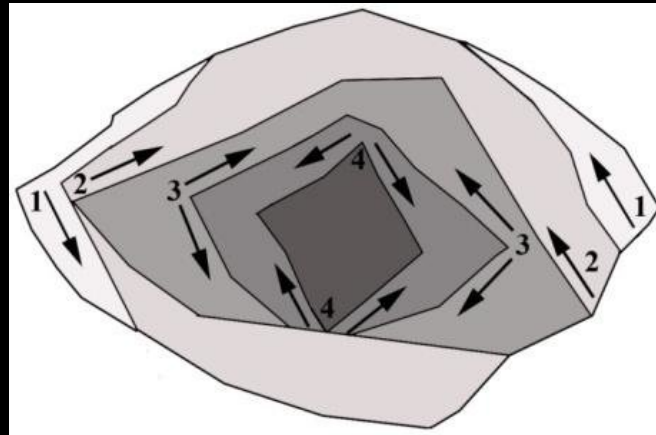
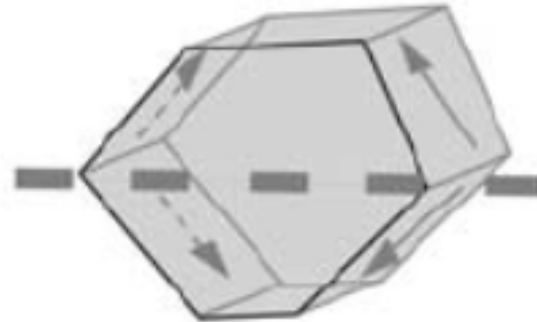
Discoid debitage

Discoid debitage

Levallois *debitage*



Discoidal *debitage*



Discoid debitage

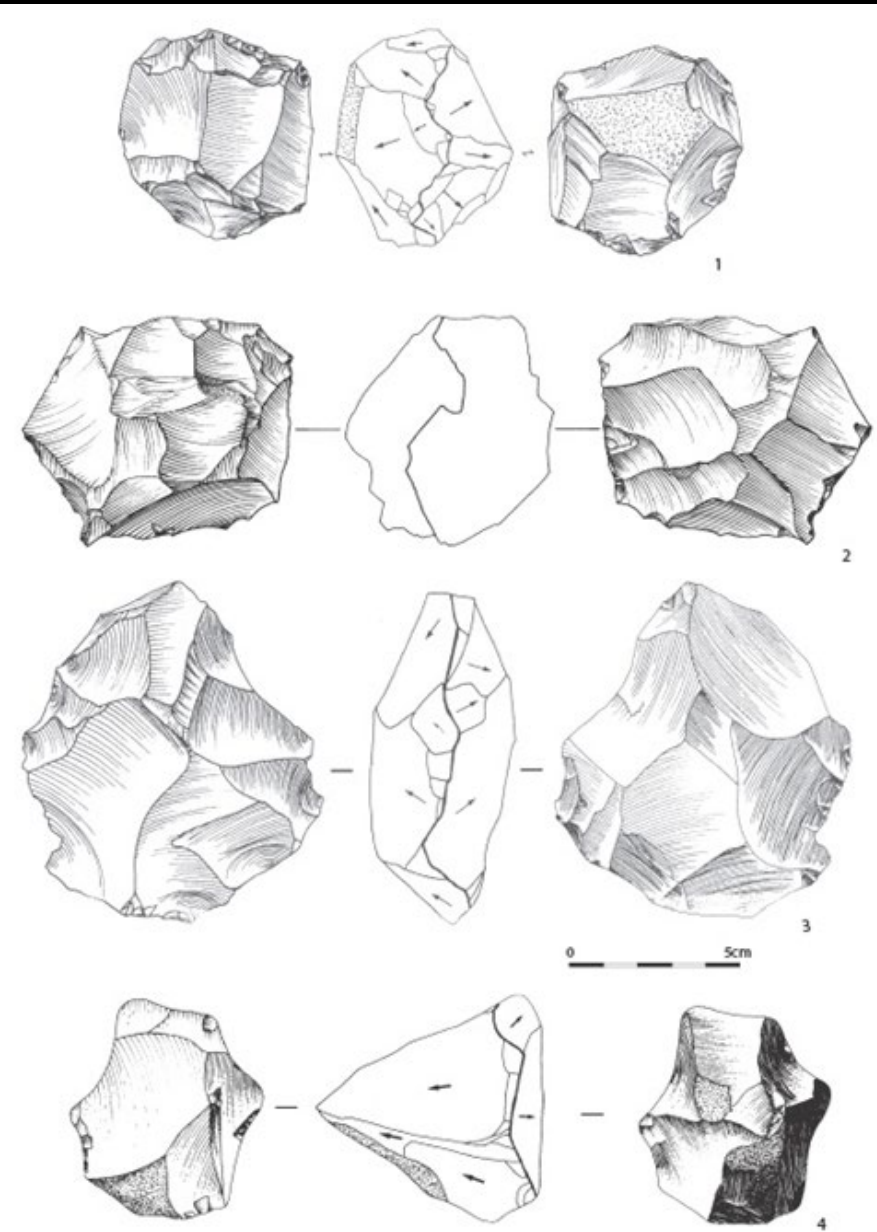


Planche 44 : 1. à 3. Nudéus discoïde à deux surfaces convexes.

4. Nudéus discoïde présentant une surface assez plane ; la seconde est pyramidale.

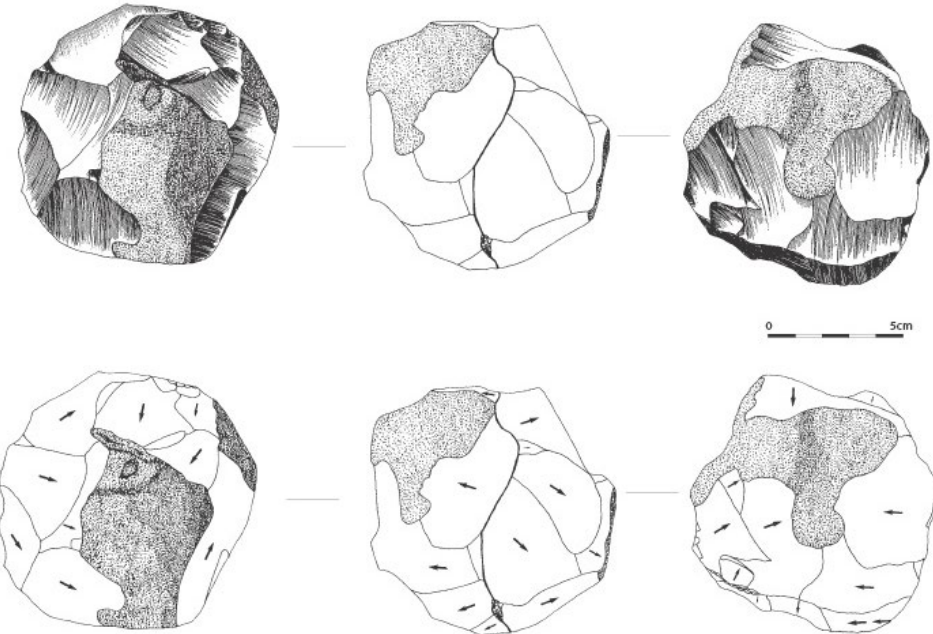
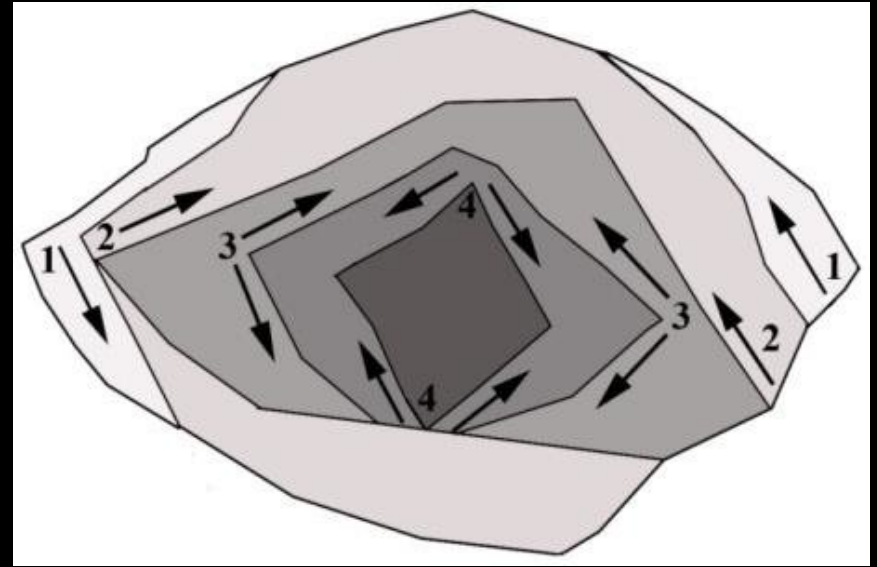
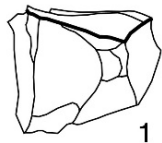
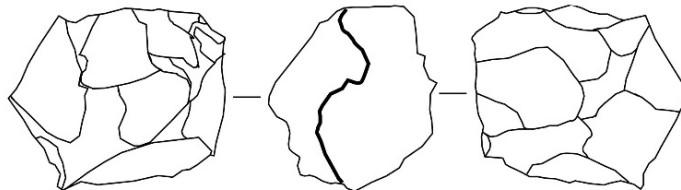


Planche 45 : nucléus discoïde à deux surfaces convexes exploitées alternativement. Les plages corticales présentes sur les deux surfaces productives permettent d'estimer la morphologie initiale du bloc de silex.

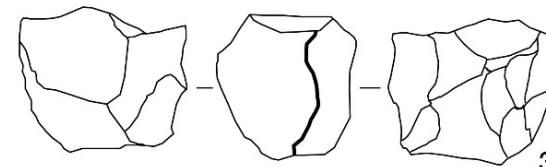
Discoid debitage



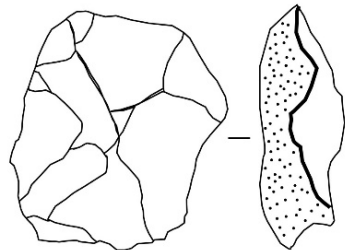
1
Nucléus discoïds à deux surfaces perpendiculaires.



2
Nucléus discoïde à deux surfaces exploitées alternativement.



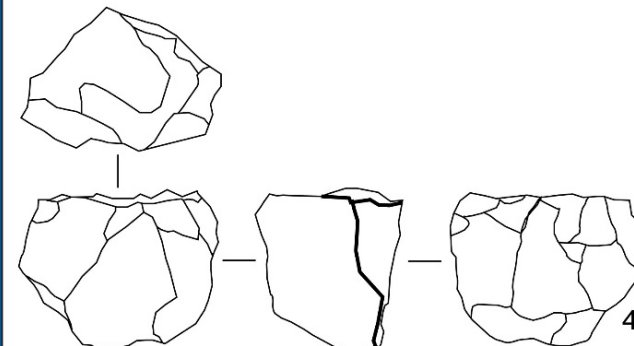
3
Nucléus discoïde à deux surfaces exploitées alternativement de forme pyramidale.



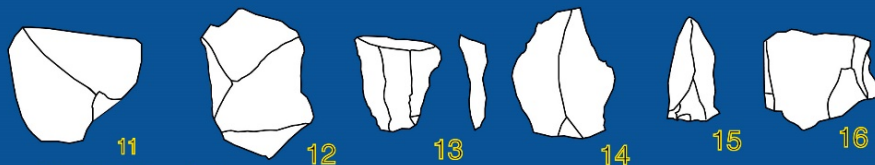
6
Nucléus discoïde uniface.



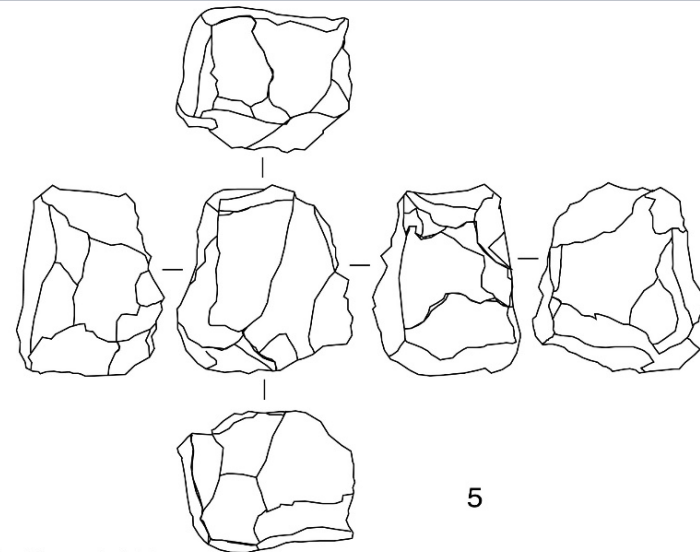
7
Nucléus discoïde sur éclat.



4
Nucléus discoïde à deux surfaces exploitées alternativement + création d'une troisième surface.

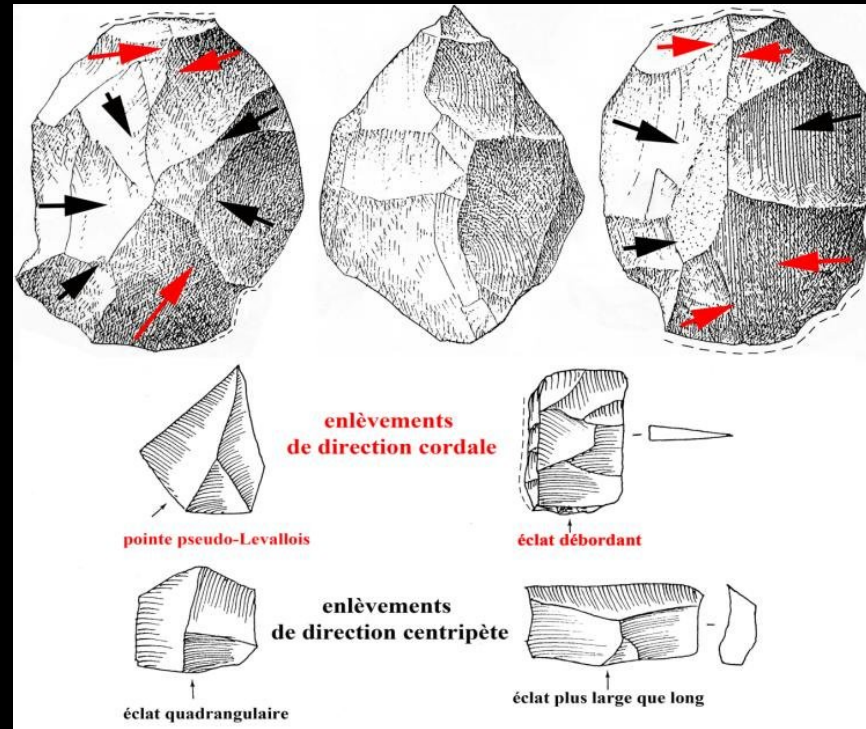


11 et 12. Éclats à dos.
13. Éclat à profil brisé.
14. Éclat régulier.
15. Éclat allongé.
16. Éclat large.

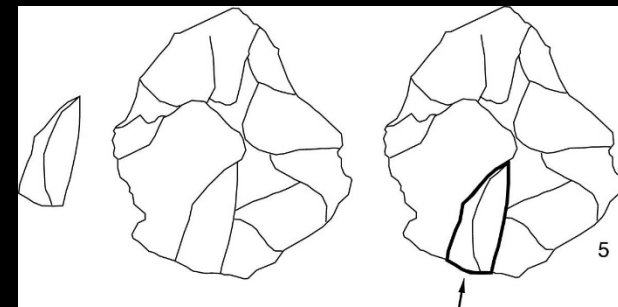
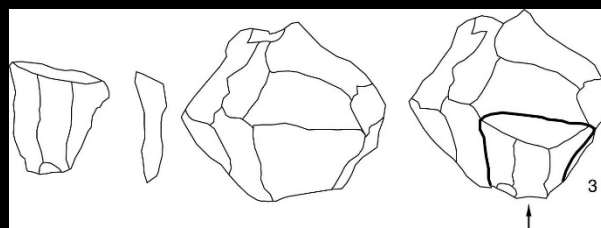
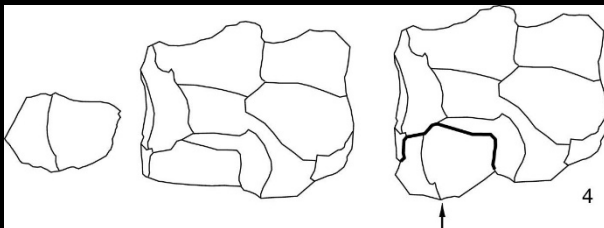
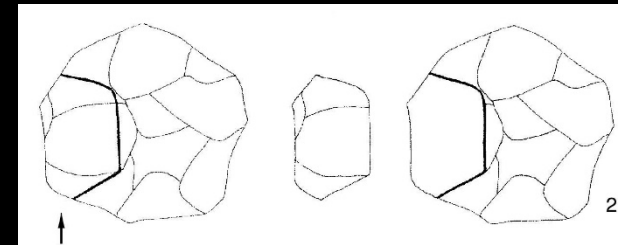
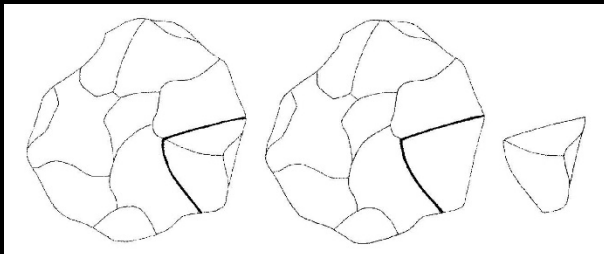


5
Nucléus polyédrique

Discoid debitage

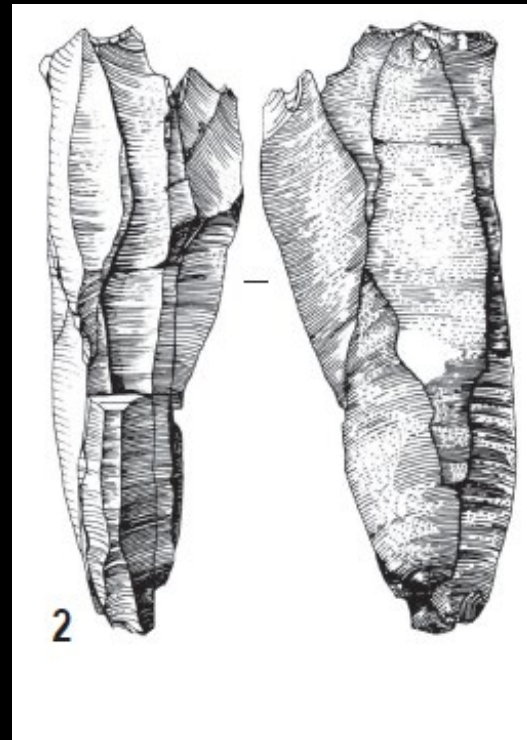
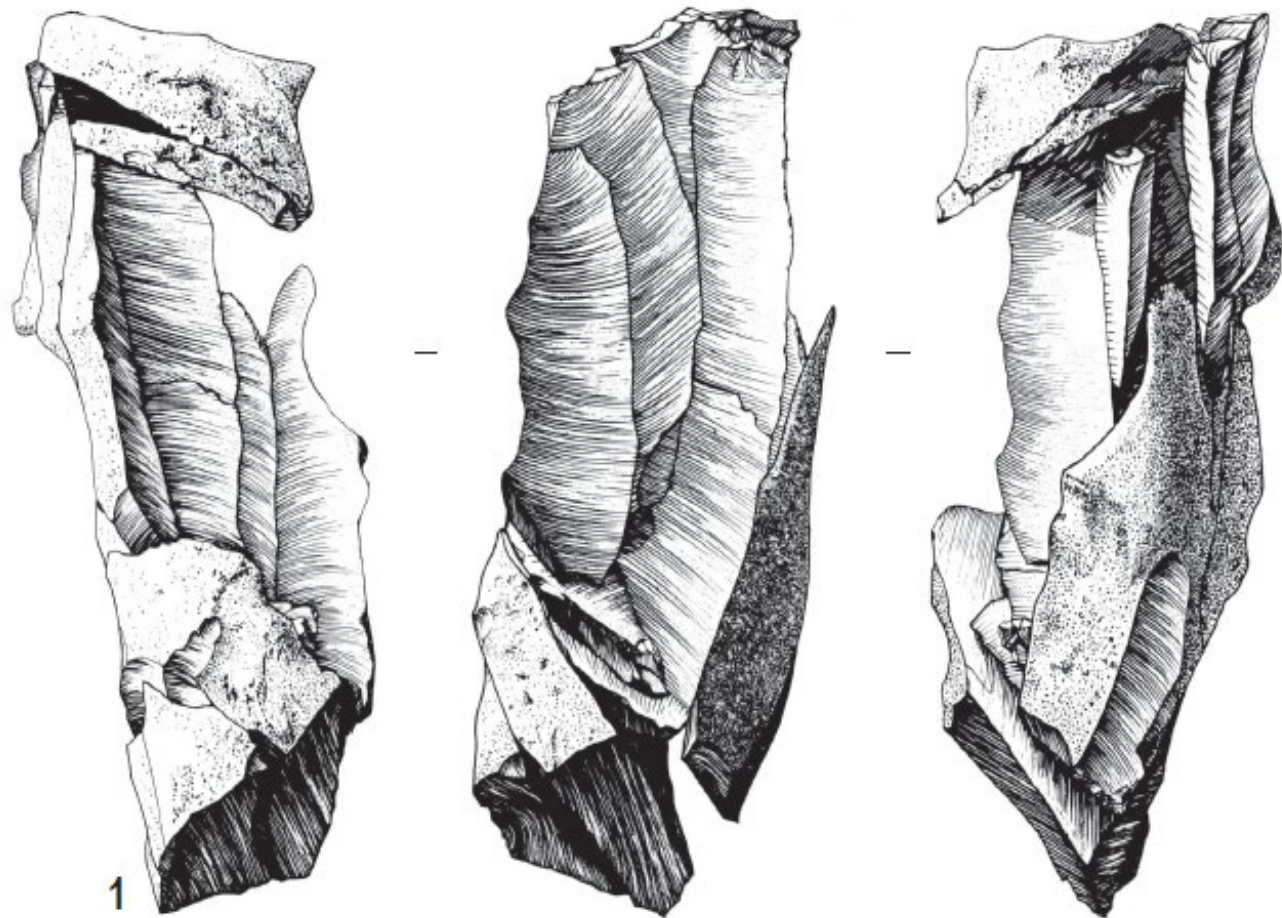


Locht, 2004 thèse



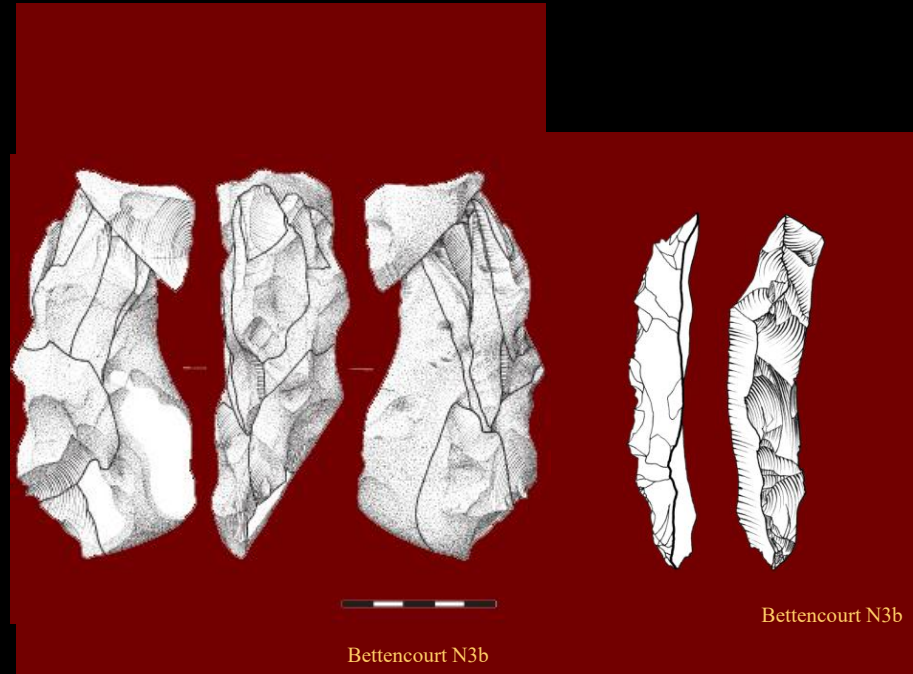
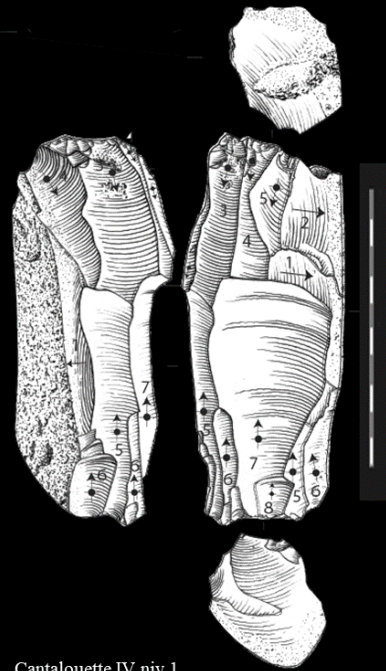
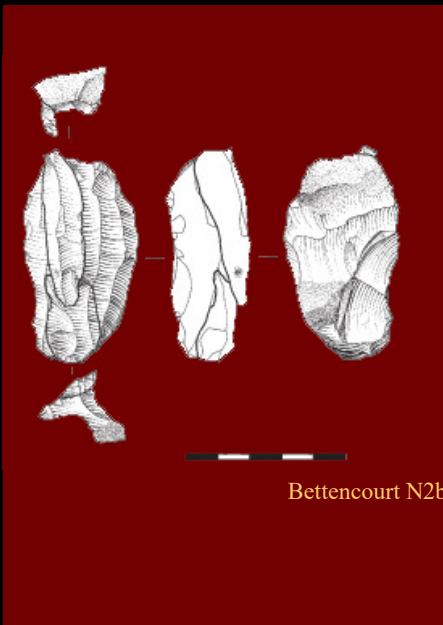
Blade debitage

Blade debitage



Blade debitage

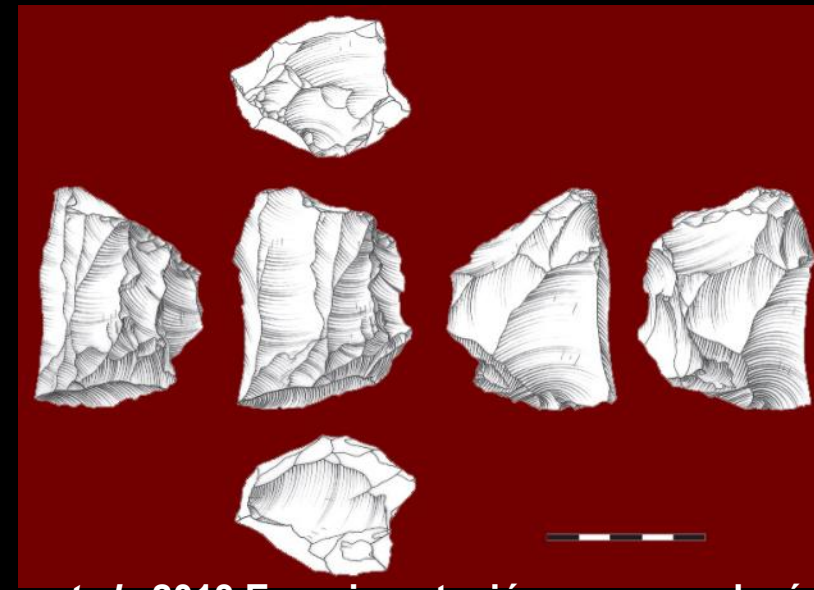
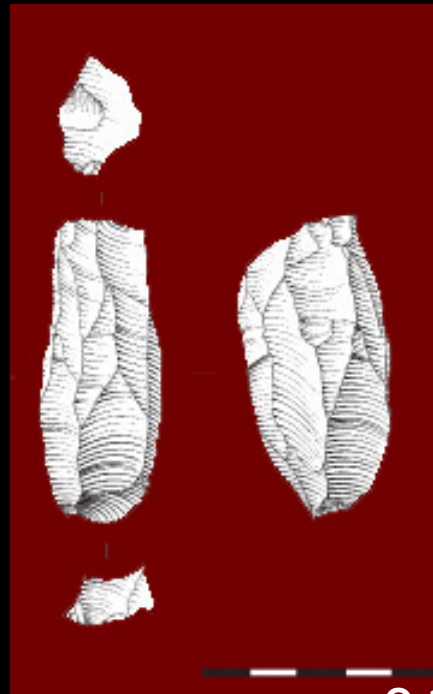
construction volumétrique du nucléus				
Volume exploitée /surface productionnelle		type de démarrage		
plus longue/plus étroite	plus longue/plus large	lame d'entame	crête axiale	crêtes latérales et/ou dorsal
Cantalouette IV				
La Mouline				
Tamniès				
Fresnoy-au-Val				
Bettencourt-Saint-Ouen N2b				
Fitz-James				
Bettencourt-Saint-Ouen N3b				
Vallée de la Vanne				
Garris 2				
Cantalouette IV niv.1				



Blade debitage

Cantalouette IV
La Mouline
Tamniès
Fresnoy-au-Val
Bettencourt-Saint-Ouen N2b
Fitz-James
Bettencourt-Saint-Ouen N3b
Vallée de la Vanne
Garris 2
Cantalouette IV niv.1

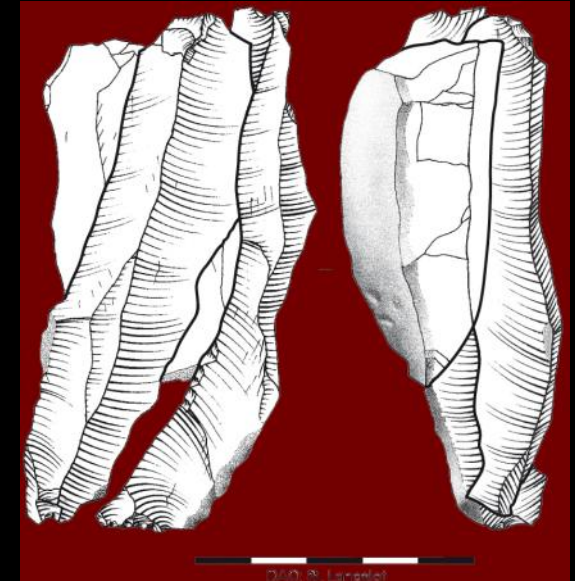
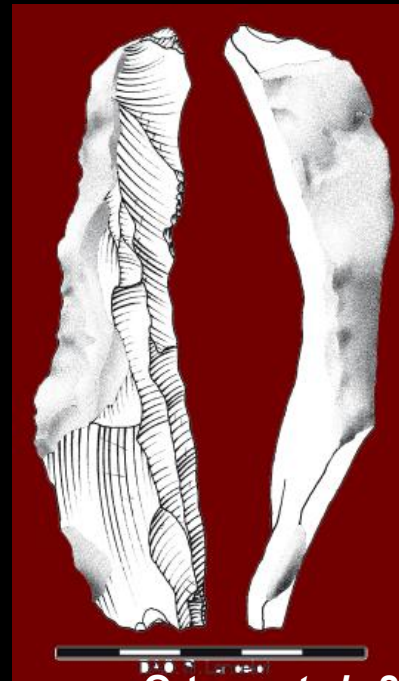
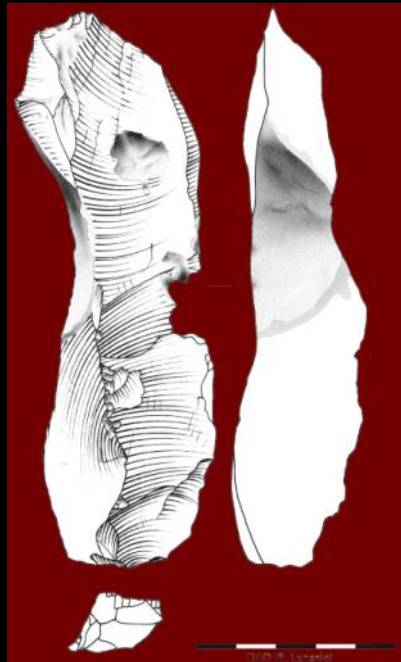
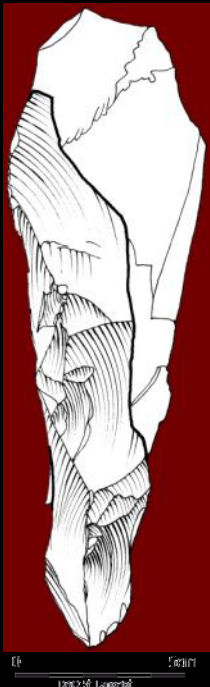
Gestion du débitage					
production			évolution du débitage		
unipolaire parallèle	convergent	"bipolaire" parallèle	tournant	semi- tournant	frontal



Blade debitage

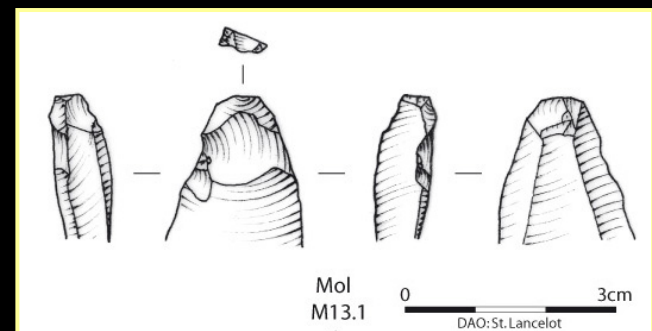
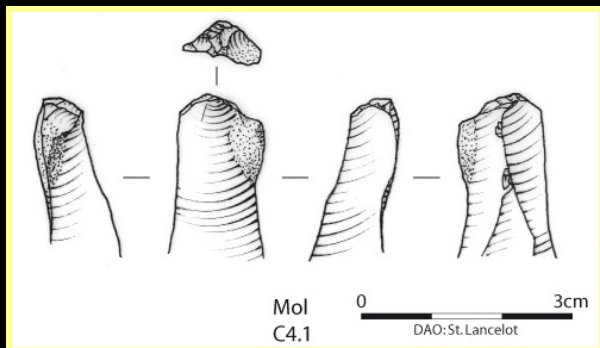
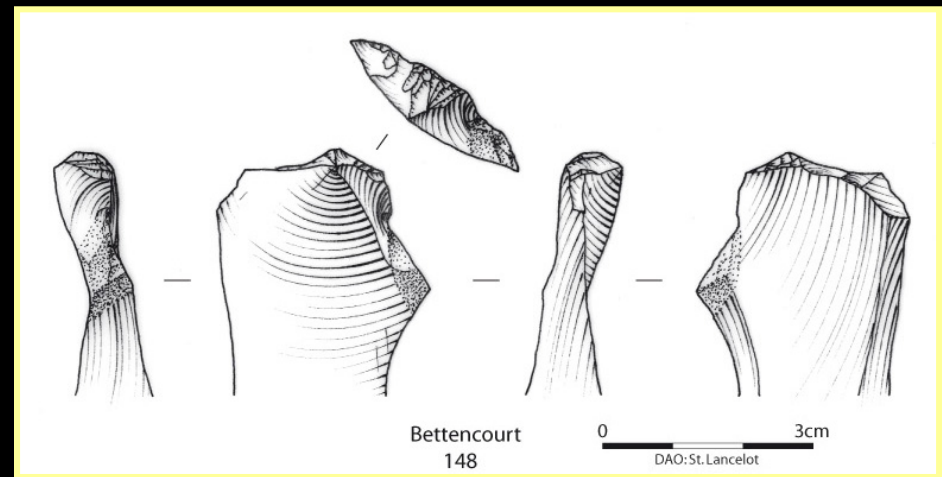
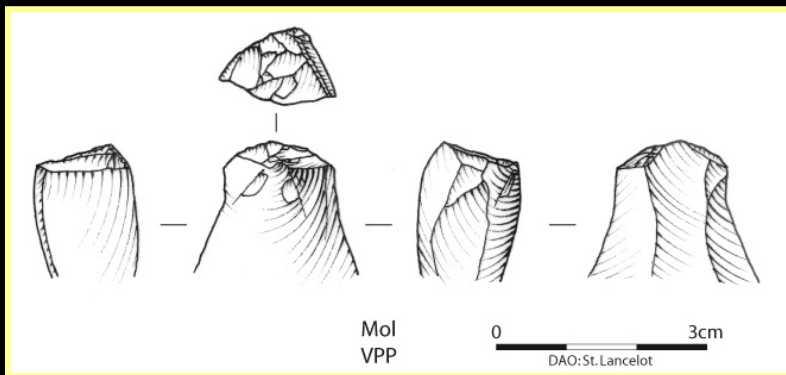
réaménagement			
convexités latérales/carénage		convexité distale/cintrage	
néo-crêtes	produits de flancs	néo-crêtes	plan de frappe opposé

Cantalouette IV
 La Mouline
 Tamniès
 Fresnoy-au-Val
 Bettencourt-Saint-Ouen N2b
 Fitz-James
 Bettencourt-Saint-Ouen N3b
 Vallée de la Vanne
 Garris 2
 Cantalouette IV niv.1



Blade debitage

Plan de frappe et procede de preparation							
plans de frappe			du point de percussion			autres préparations (angle de chasse)	
plan lisse	éclats de ravivage	tablettes	talon facetté	talon facetté oblique	éperons	abrasion corniche	repise des nervures
Cantalouette IV							
La Mouline			?				
Tamniès							
Fresnoy-au-Val							
Bettencourt-Saint-Ouen N2b							
Fitz-James							
Bettencourt-Saint-Ouen N3b							
Garris 2							
Cantalouette IV niv.1			?				

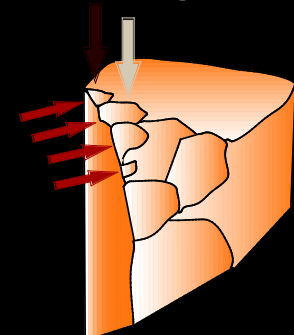


Blade debitage

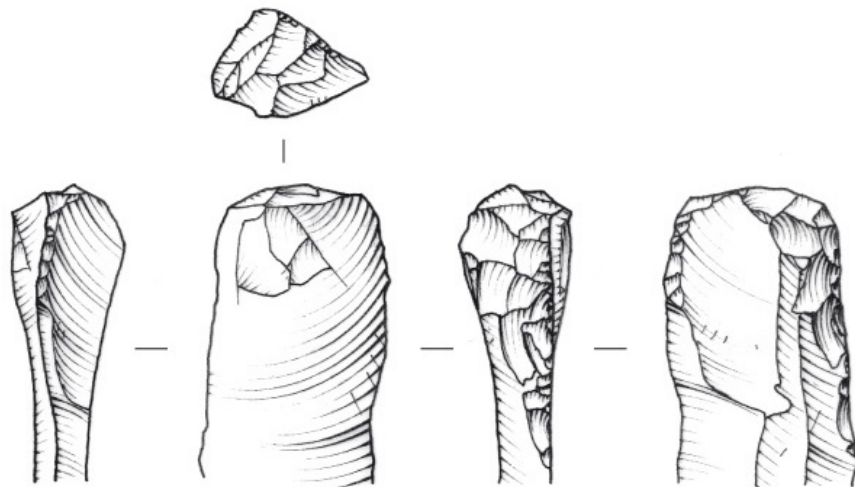
Plan de frappe et procede de preparation							
plans de frappe			du point de percussion			autres préparations (angle de chasse)	
plan lisse	éclats de ravivage	tablettes	talon facetté	talon facetté oblique	éperons	abrasion corniche	repise des nervures
Cantalouette IV							
La Mouline			?				
Tamniès							
Fresnoy-au-Val							
Bettencourt-Saint-Ouen N2b							
Fitz-James							
Bettencourt-Saint-Ouen N3b							
Garris 2							
Cantalouette IV niv.1			?				

Point de contact recherché par le tailleur

Ajout d'un facettage latéralisé oblique
Pour déplacer le futur point de contact
Vers le centre de la table et/ou
Renforcer la zone d'impact



D'après L. Klaric 2003



Tournerie
2755

0 3cm
DAO:St.Lancelot

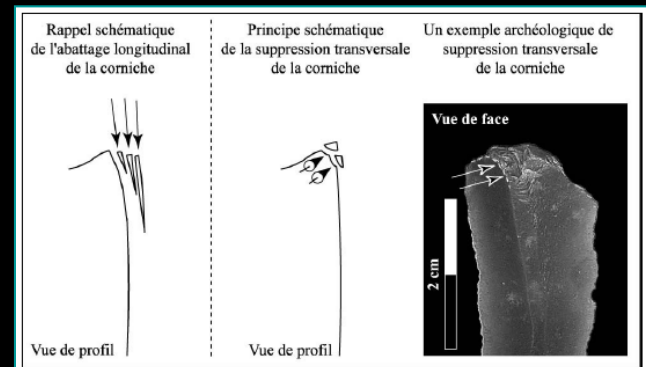


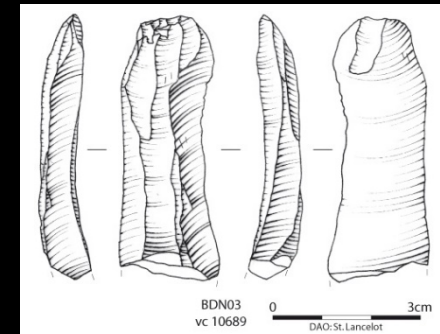
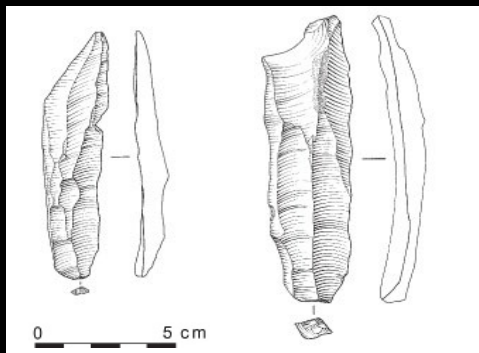
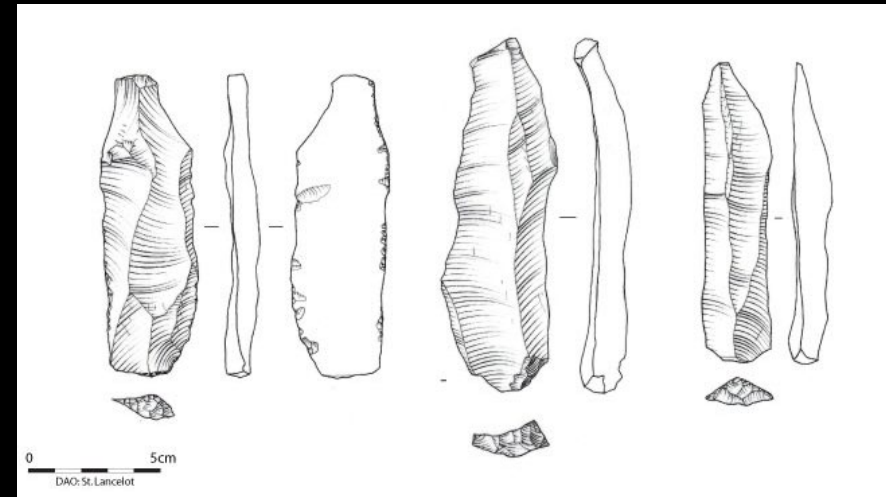
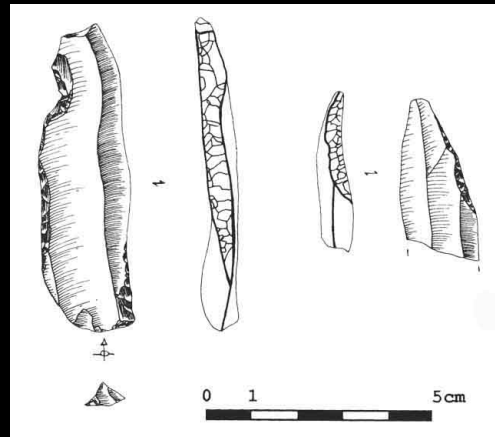
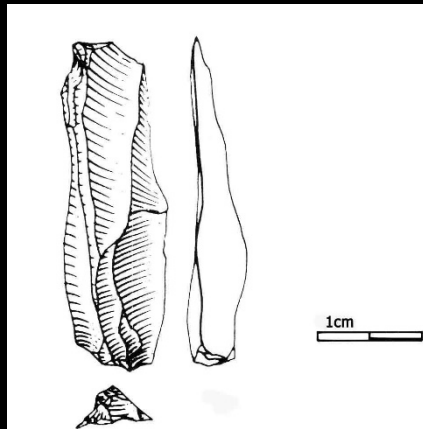
Fig. 37 - Le principe de la suppression transversale de corniche (peut s'obtenir par extraction de petits éclats et/ou abrasion transversale de la nervure)

L. Klaric 2003

Blade debitage

■ Principales caractéristiques morphologiques des produits laminaires

	produits laminaires					
	rectiligne	courbe	bords parallèles	bords convergents	parallélo-convergent	nervures parallèles
Cantalouette IV						
La Mouline						
Tamniès						
Fresnoy-au-Val						
Bettencourt-Saint-Ouen N2b						
Fitz-James						
Bettencourt-Saint-Ouen N3b						
Garris 2						
Cantalouette IV niv.1						



*Phénomène de réduction de
la chaîne opératoire
laminaire
(série C 12)*





*Phénomène de réduction de
la chaîne opératoire
laminaire
(échantillon de la série C)*



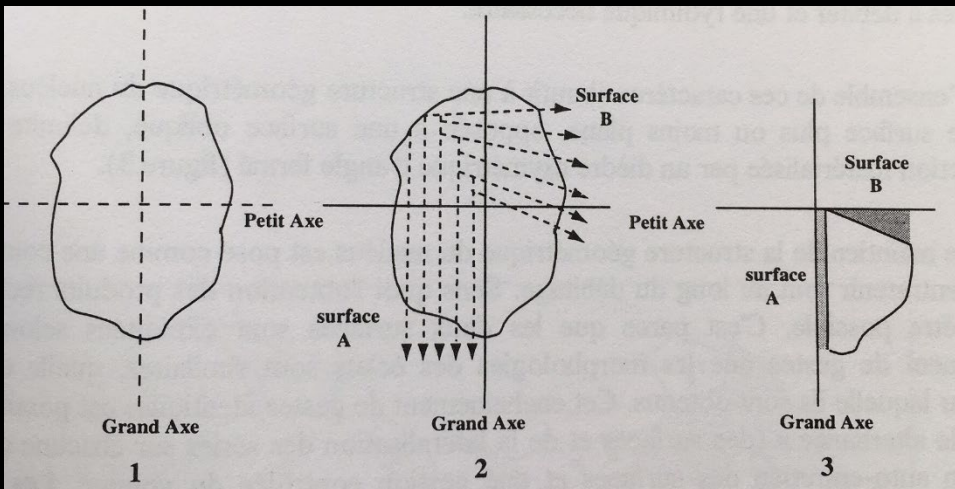
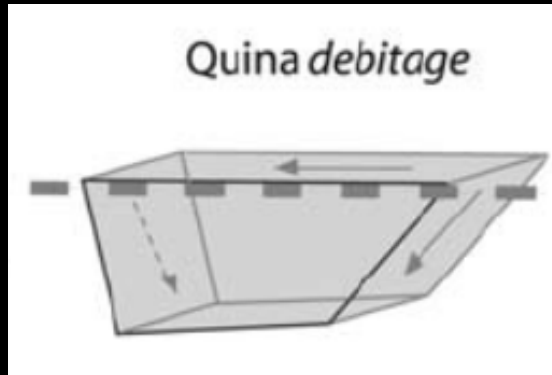
Quina debitage

Quina debitage

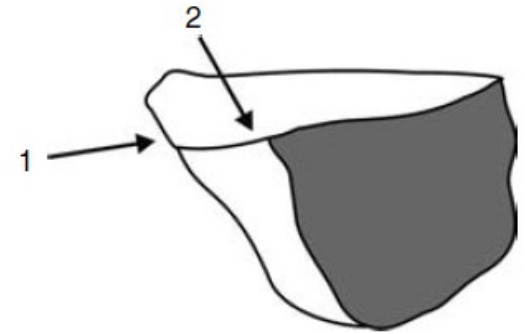
Chapter 17

QUINA PROCUREMENT AND TOOL PRODUCTION

Peter Hiscock¹, Alain Turq², Jean-Philippe Faivre³, and
Laurence Bourguignon⁴



(a)



Basic format
for Quina
core reduction

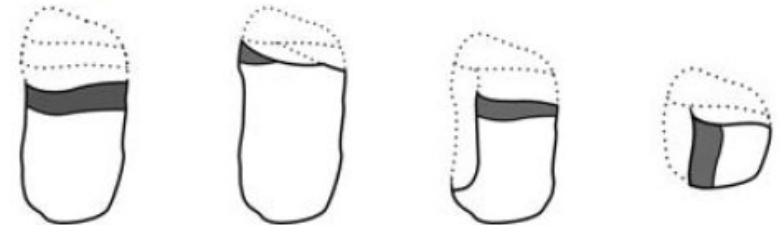
(b)

Salami
slicing

Cortical
backed

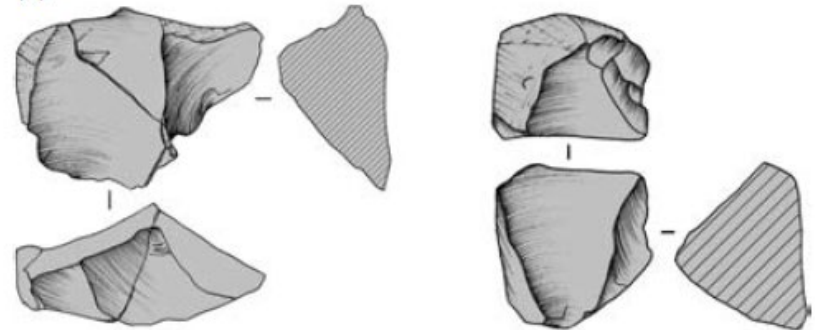
Cortical
covered

Recurrent
alternative

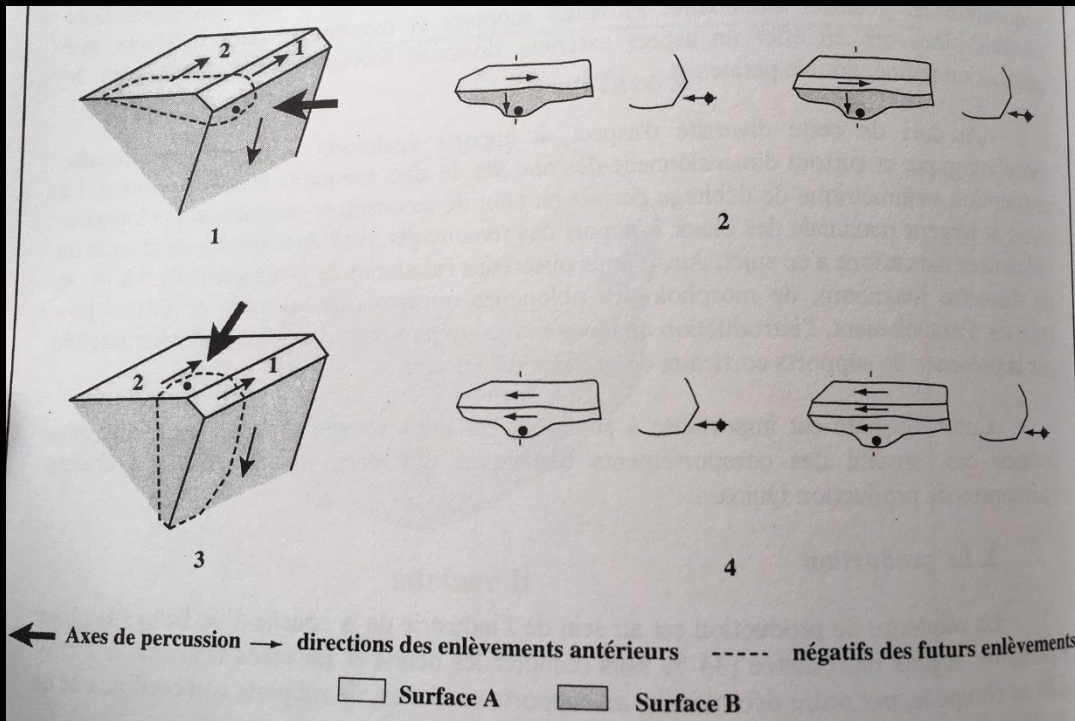
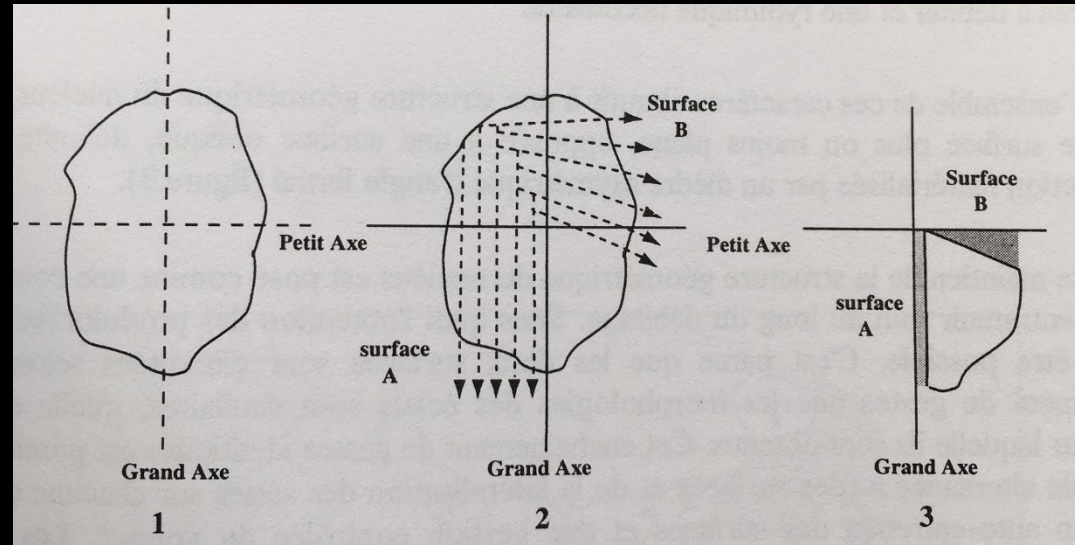
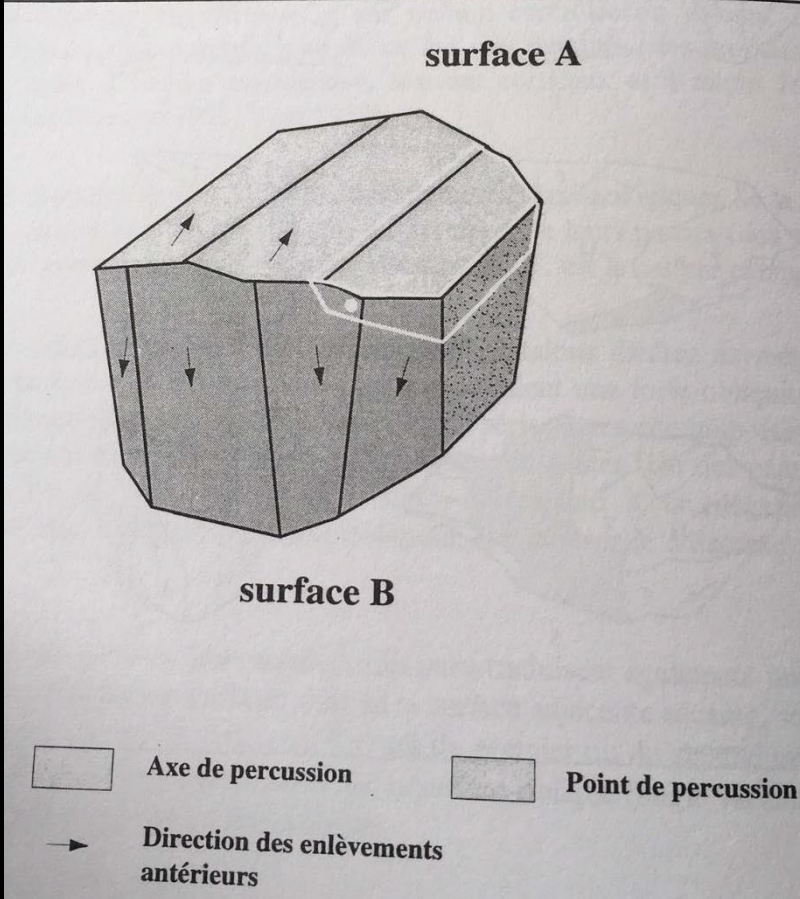
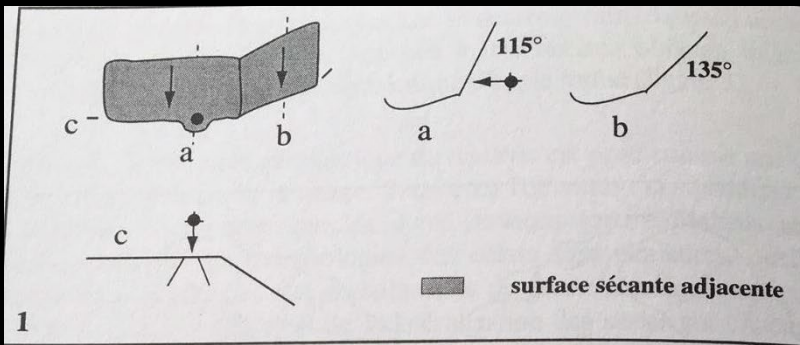


Variation in raw material shape and size

(c)



Quina debitage



Quina debitage

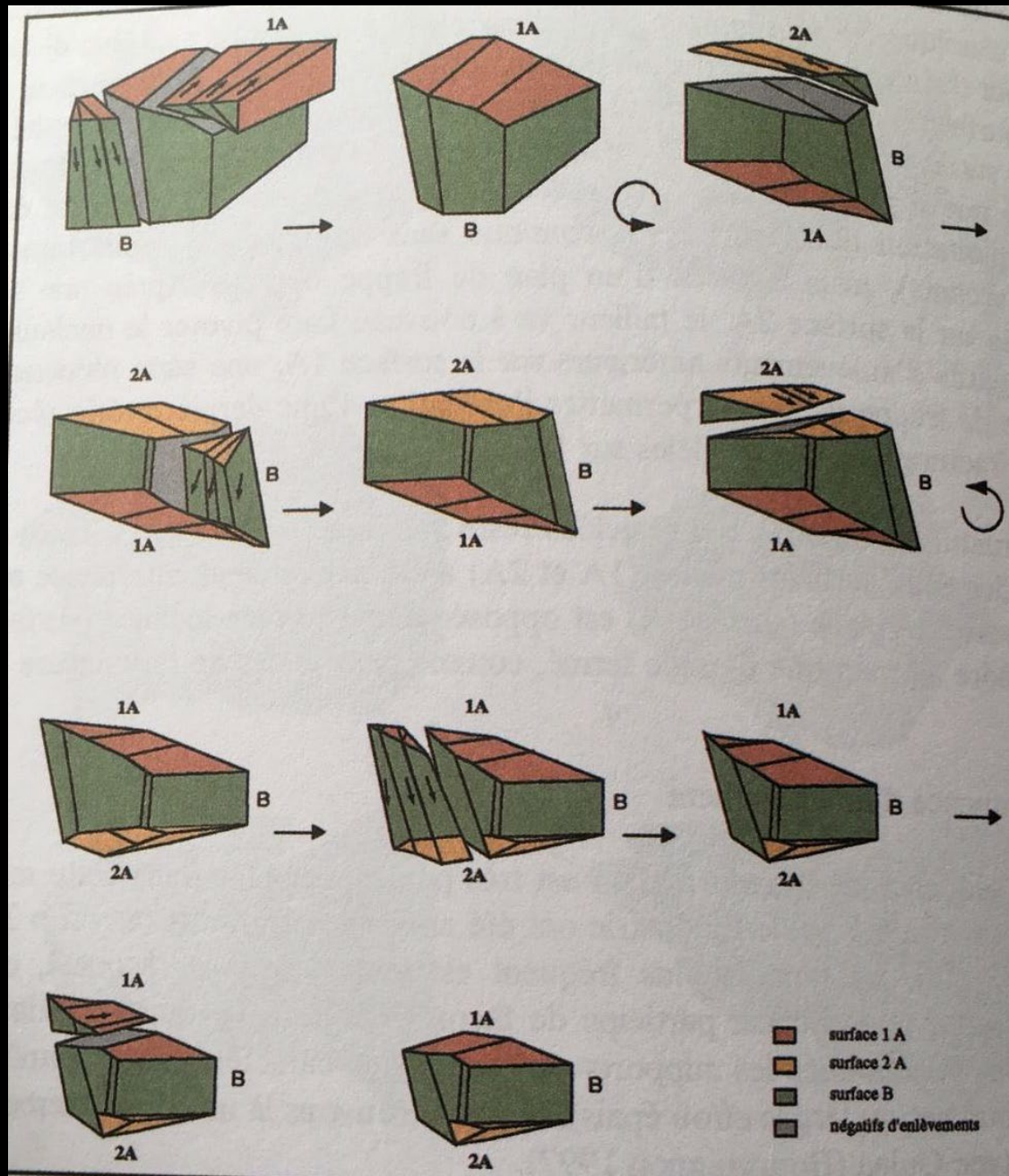


Figure 17.3 Examples of Quina flake selection and retouching from Combe Grenal (layers 17 and 20). Arrows show the sequence of reduction. (a) Unretouched flakes removed from cores, (b) Similar flakes with retouching, (c) Smaller flakes struck from retouched flakes of the kind portrayed in b, and (d) Small flakes from c that have subsequently been retouched. (Drawings by Jean-Philippe Faivre.)

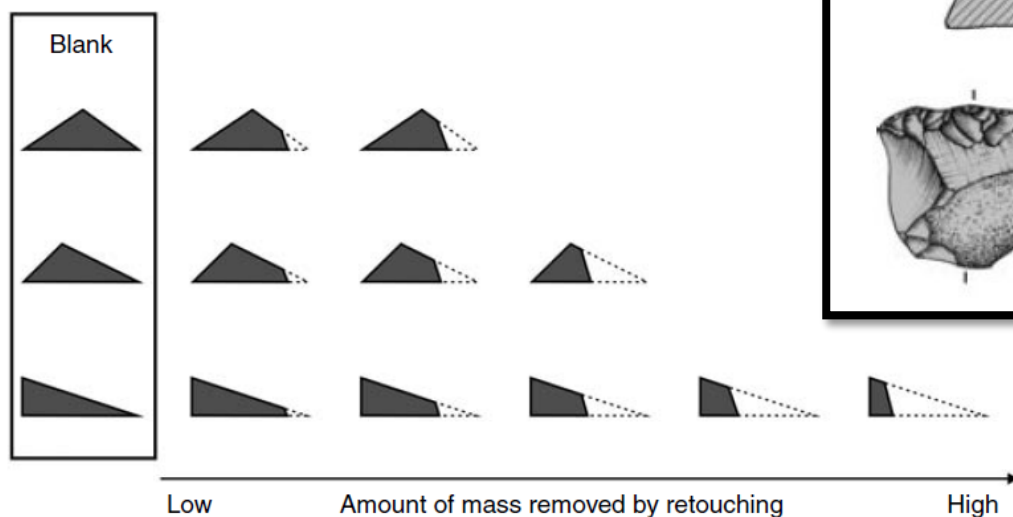
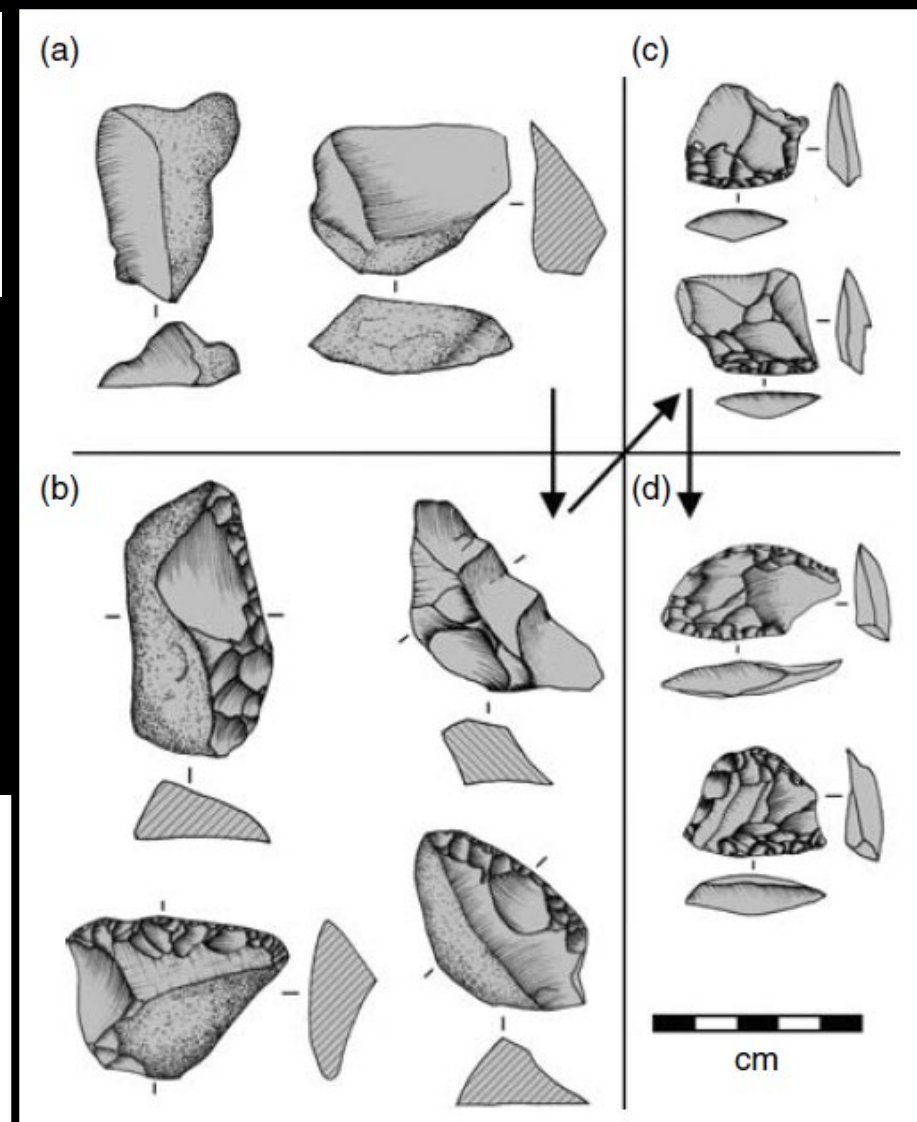


Figure 17.6 Notional illustration of the relationship of blank cross-section and extent of reduction for dorsally retouched Quina scrapers (after Turq 1992: Figure 6.2).

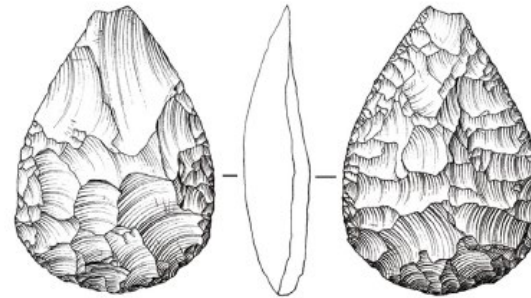
Saint-Amand-les-Eaux

MIS 3 – 49 ka

Ph. Feray dir.

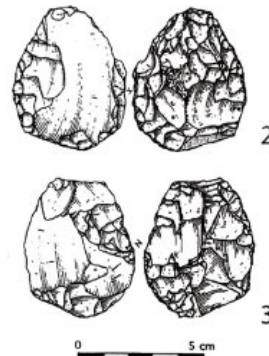


MIS 4/3 : 70-45 ka



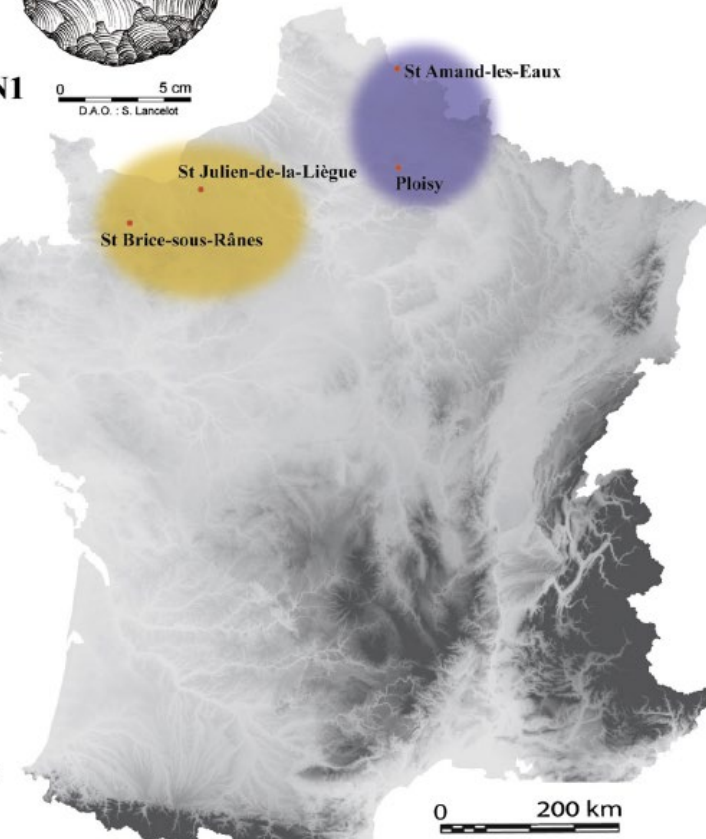
Ploisy N1

0 5 cm
D.A.O. : S. Lancelot



Saint-Brice-sous-Rânes

0 5 cm



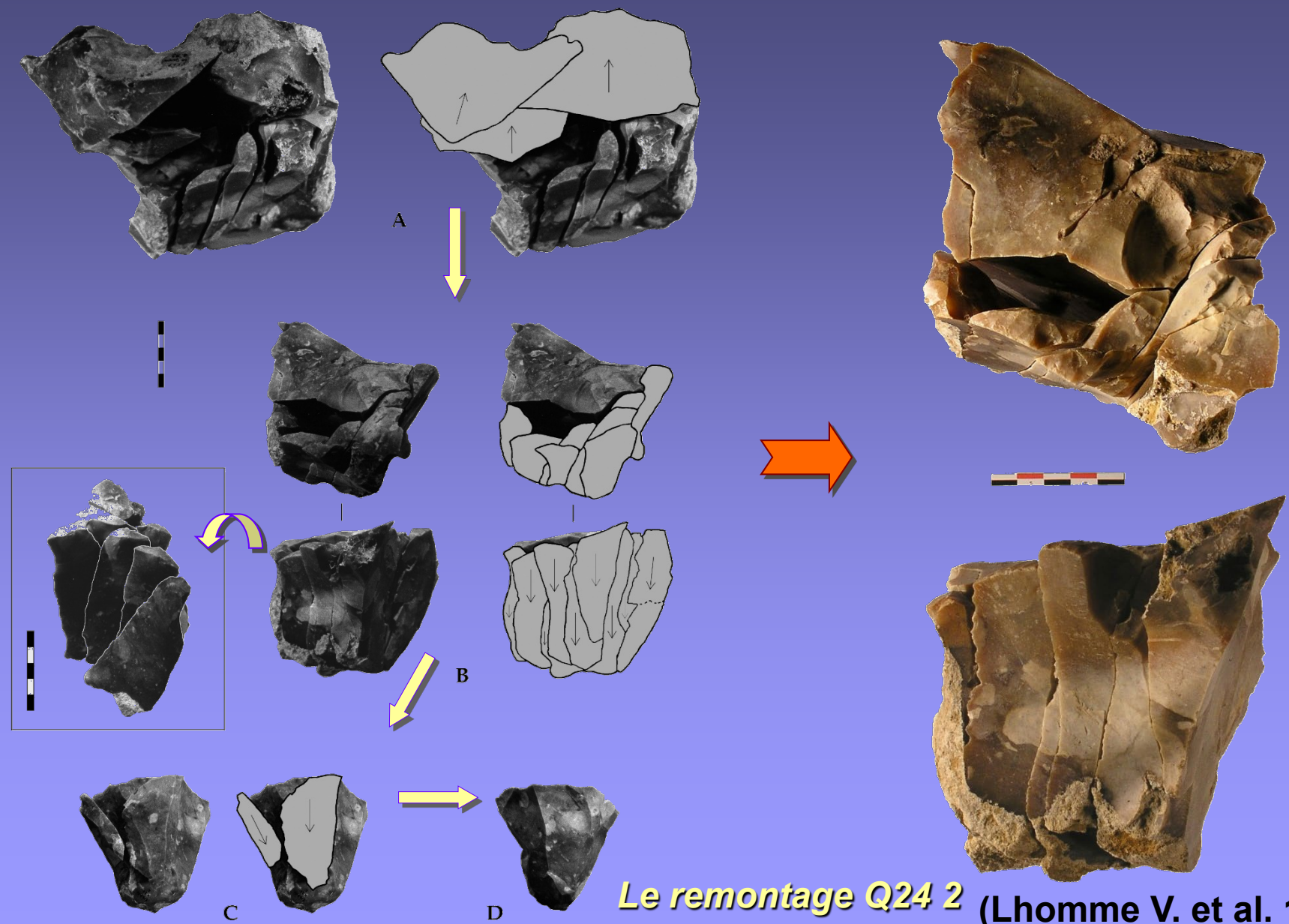
Mousterien of Acheulean tradition

Final Mousterian with bifaces

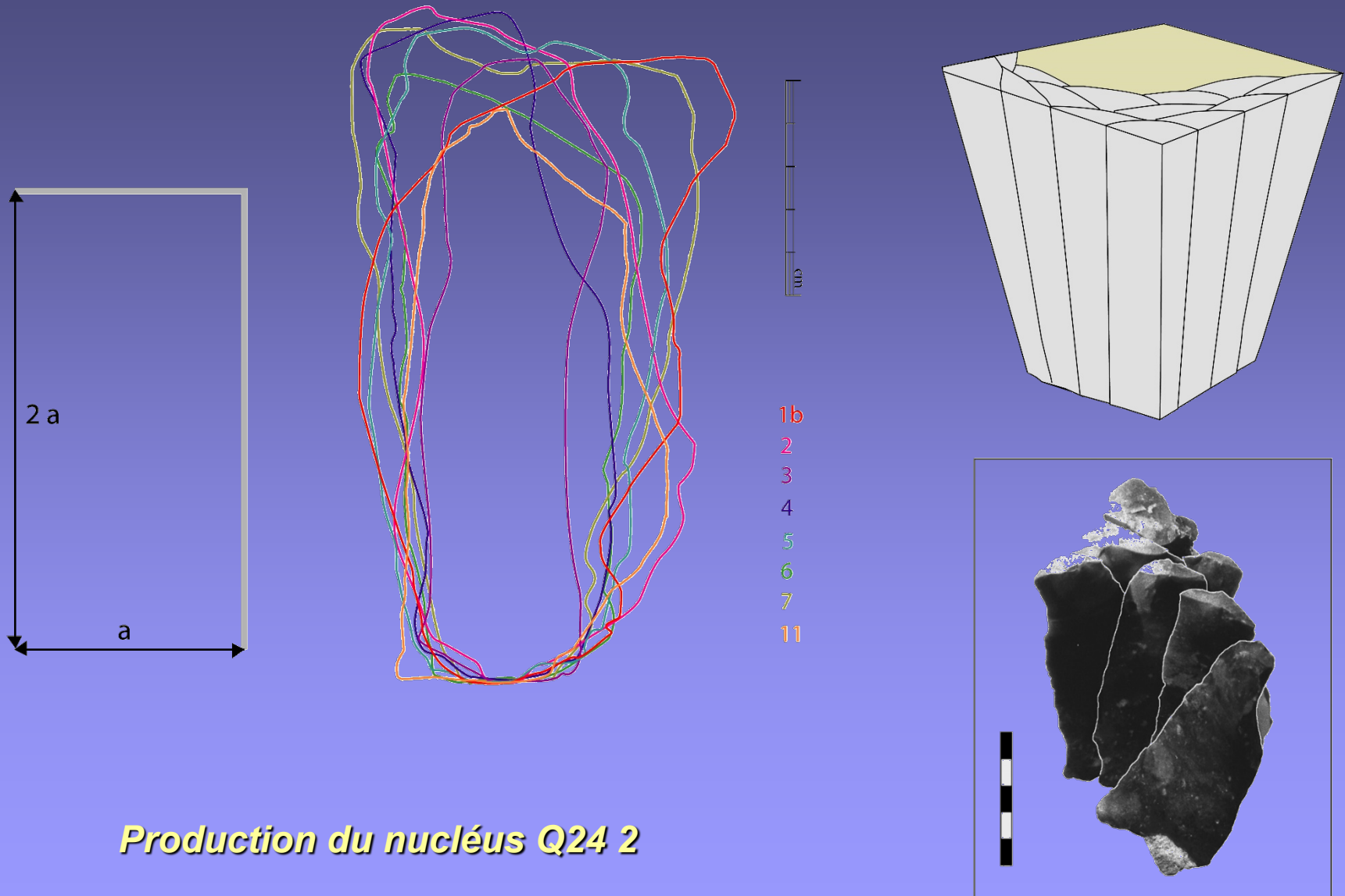
Locht et al., 2017 *QI*.

**Unknown or rare
Middle Palaeolithic
Lithic Technologies**

***Des lames sans laminaire... Le débitage Pyramidal sur le site paléolithique
moyen de la Garenne à Saint-Firmin-des-Prés (Loir-et-Cher)***

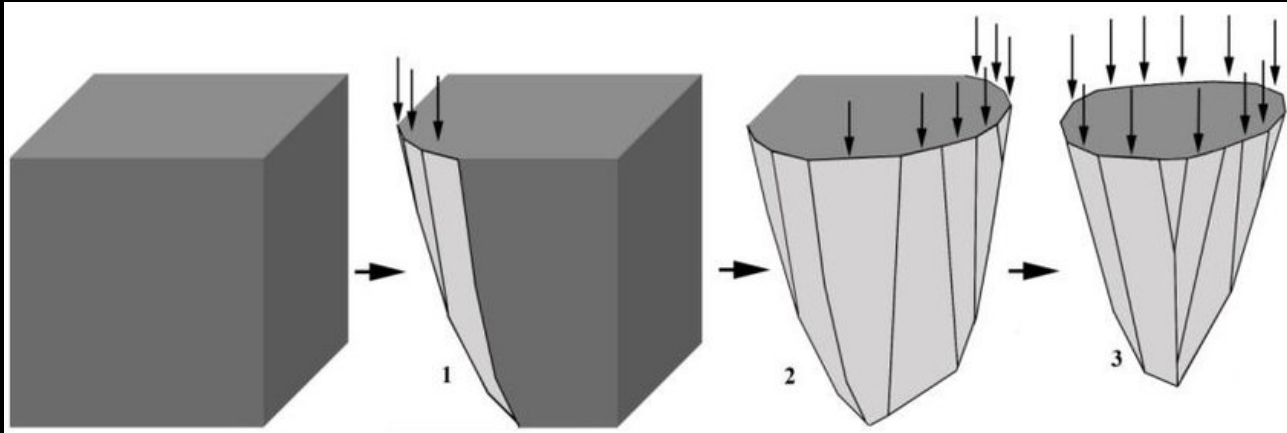


***Des lames sans laminaire... Le débitage Pyramidal sur le site paléolithique
moyen de la Garenne à Saint-Firmin-des-Prés (Loir-et-Cher)***



Production du nucléus Q24 2

Pyramidal debitage

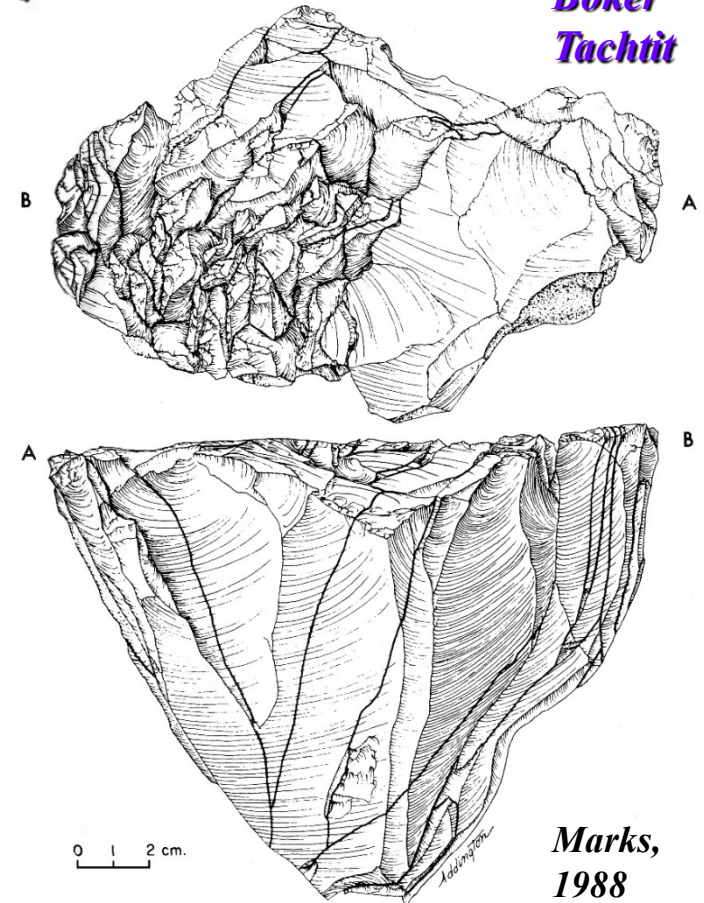


Nucléus pyramidal
avec son potentiel
d'évolution 1 quart
pyramidal, 2 semi-
pyramidal, 3 pyramidal
en fin de potentiel

*Boker
Tachtit*



Lhomme V. et al., 1999



*Marks,
1988*

The Villiers-Adam case

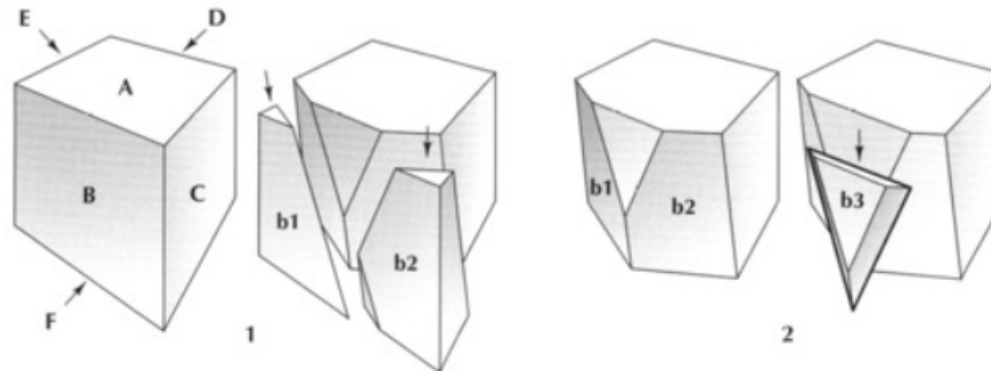


Fig. 48 – Débitage unipolaire convergent simple sur une surface (dessin P. Raymond).

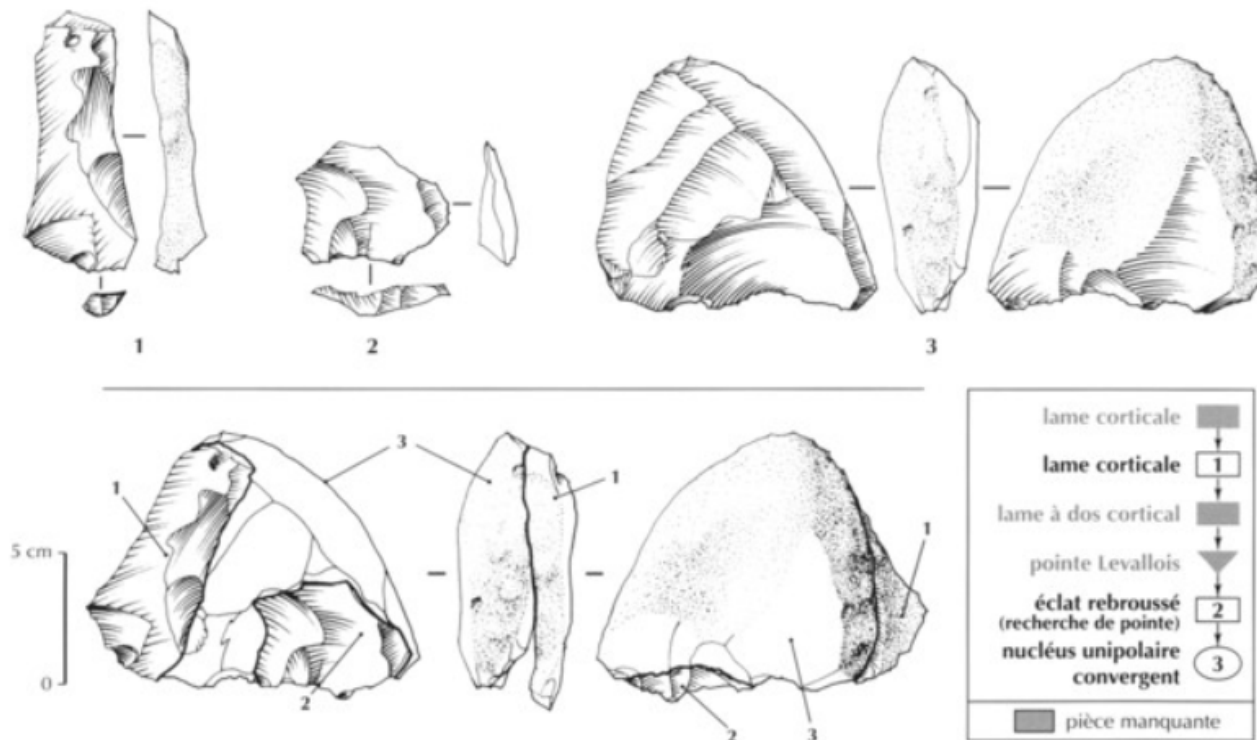


Fig. 49 – Remontage 11 (dessin P. Raymond).

The Villiers-Adam case

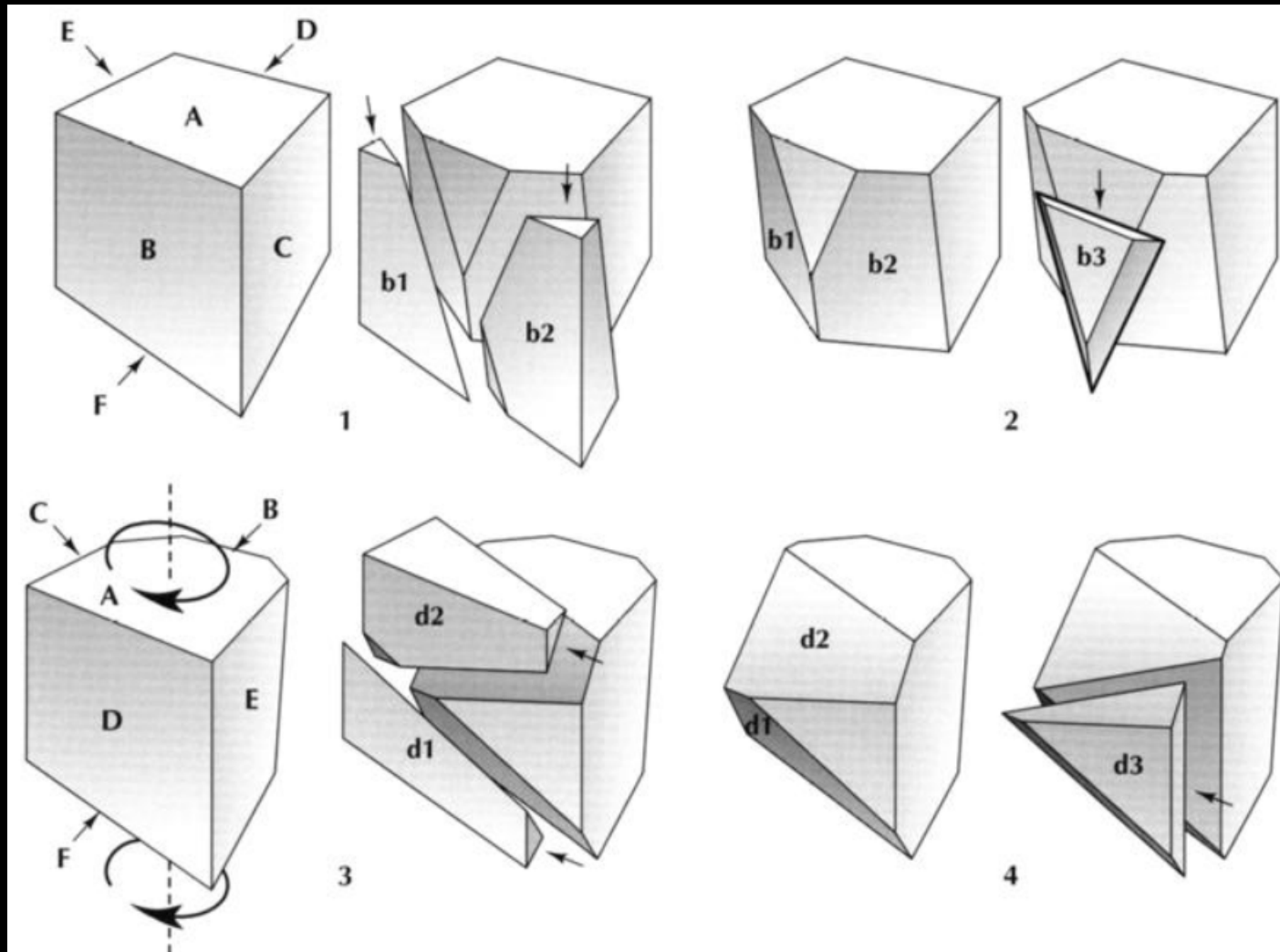


Fig. 54 – Débitage unipolaire convergent : schéma d'un bloc à deux surfaces s'inscrivant dans des plans parallèles (dessin P. Raymond).

The Villiers-Adam case

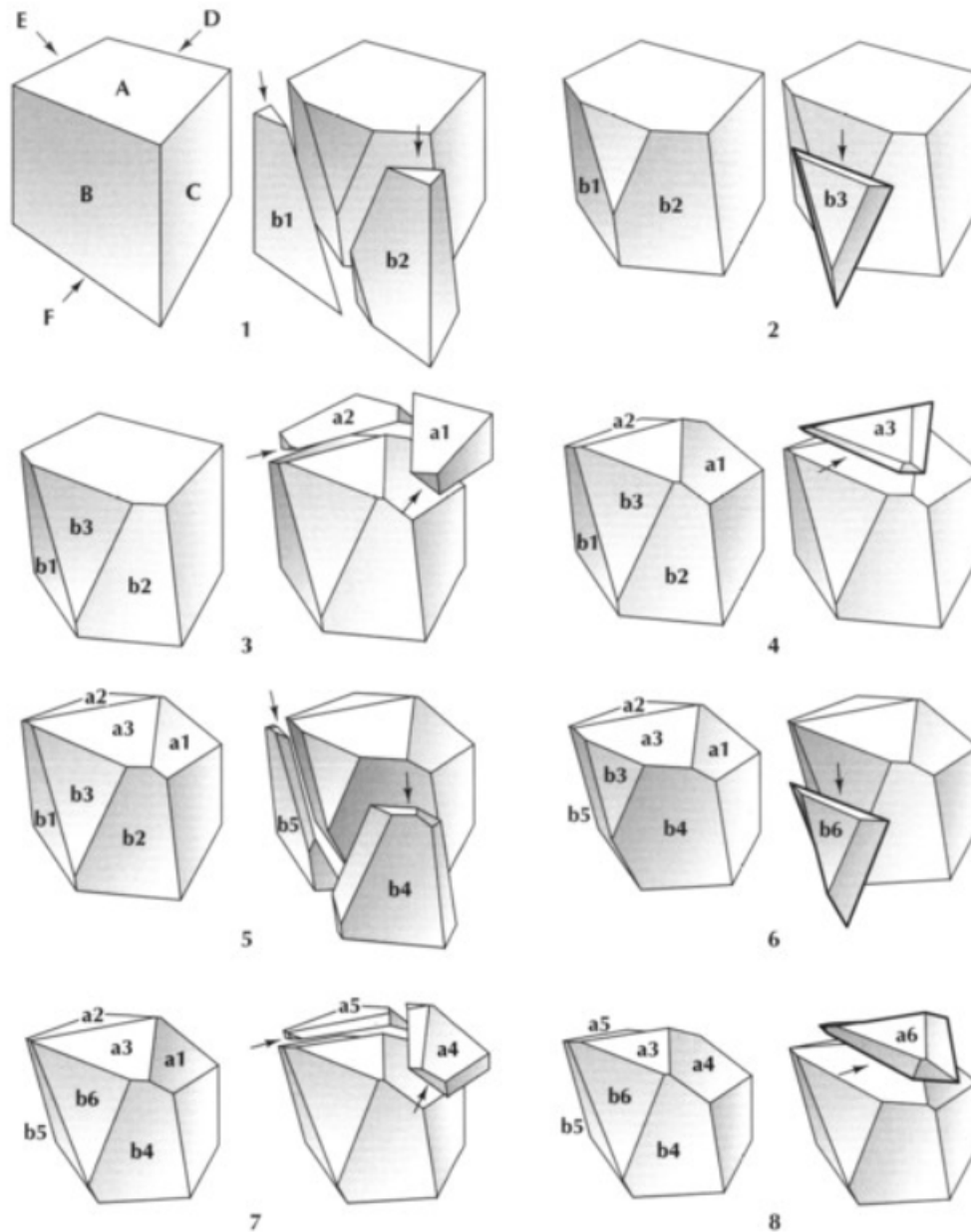


Fig. 57 – Débitage unipolaire convergent : schéma d'un bloc à deux surfaces perpendiculaires ou sécantes exploitées de façon alternative (dessin P. Raymond).

The Villiers-Adam case

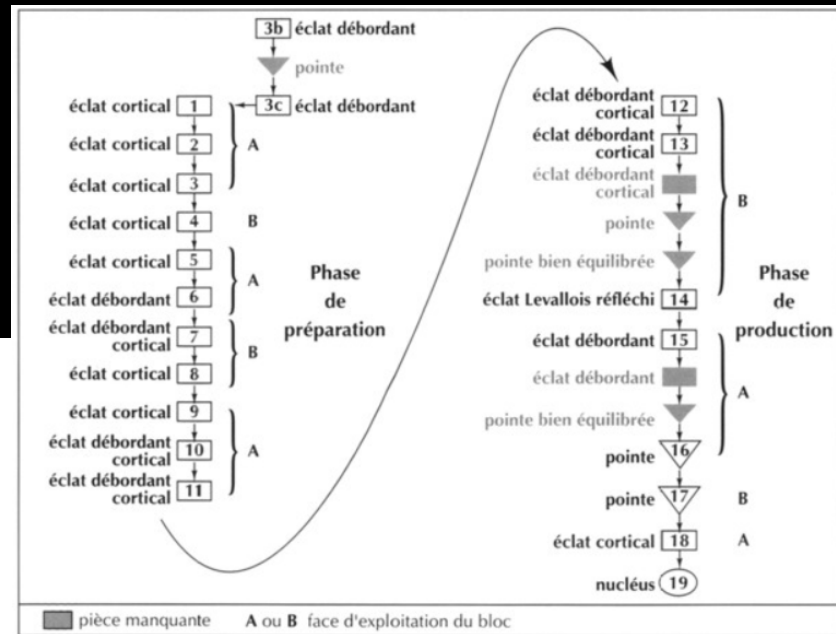
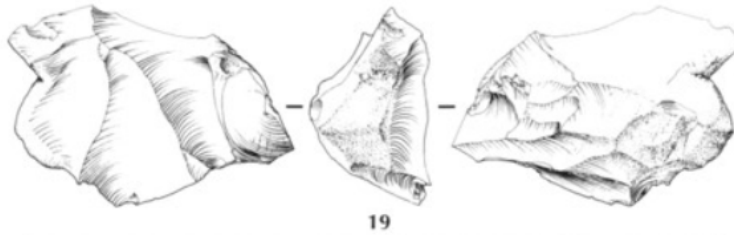
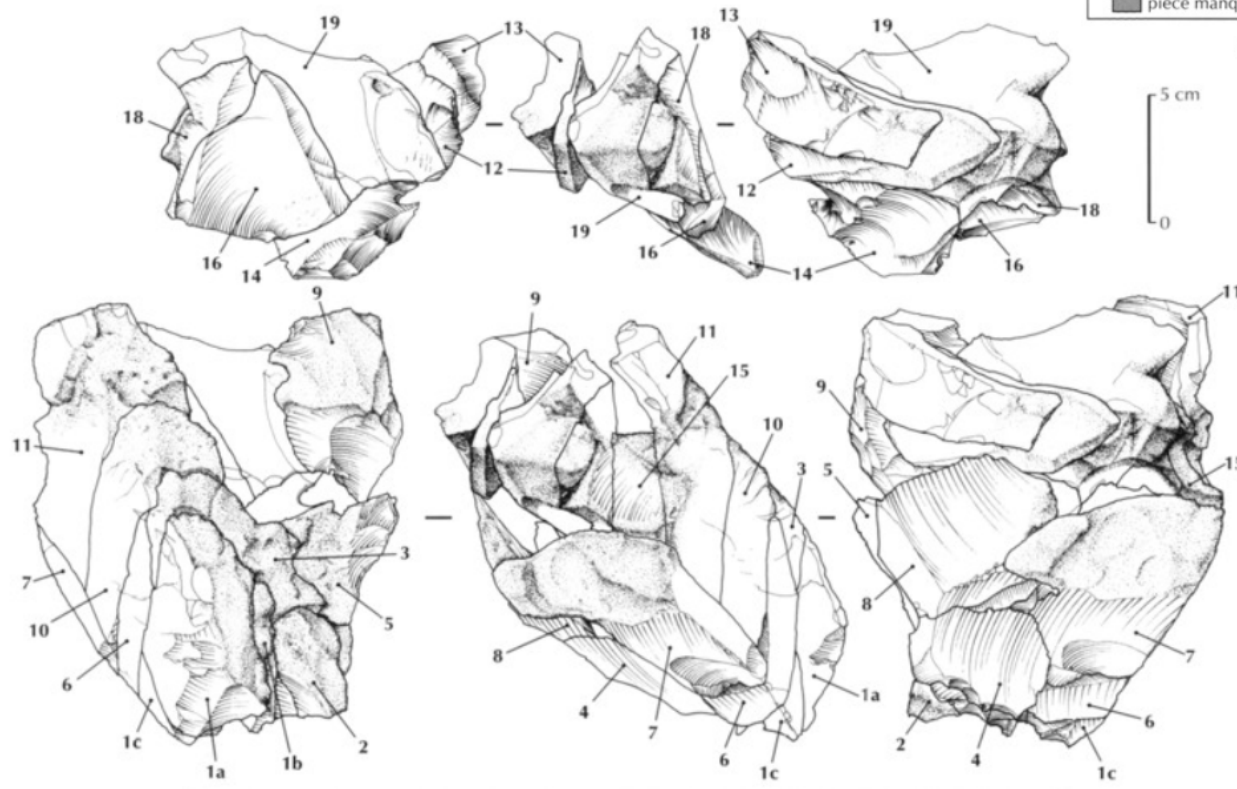


Fig. 59 – Remontage de l'ensemble 5 (dessin P. Raymond).



Production organisation

Production organisation

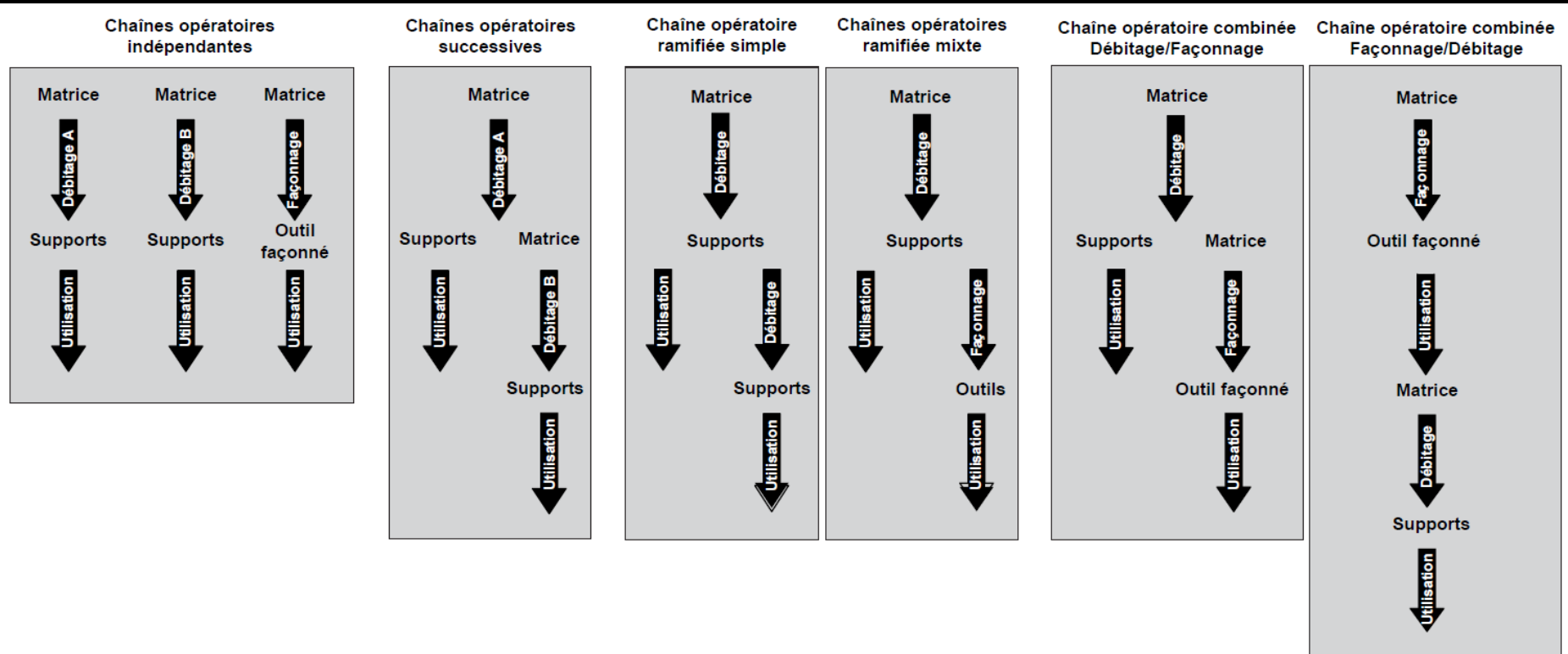
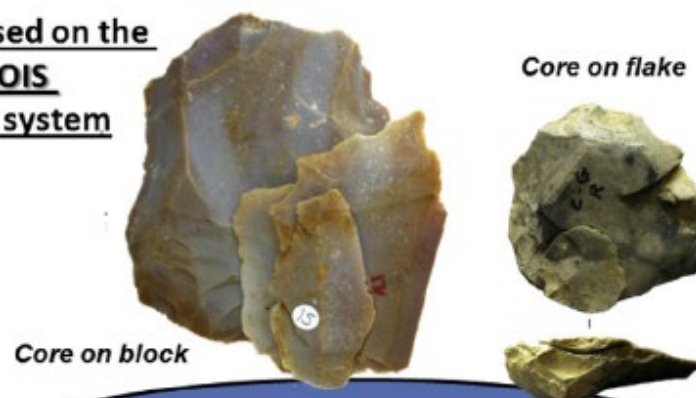


Figure 8 : Schémas synthétiques des principaux cas de figure d'indépendance, de succession ou de combinaison entre chaînes opératoires de débitage et de façonnage.

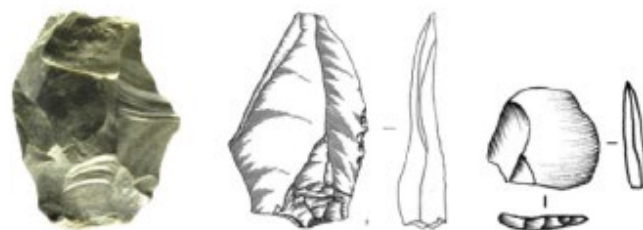
**TCL based on the
LEVALLOIS
flaking system**



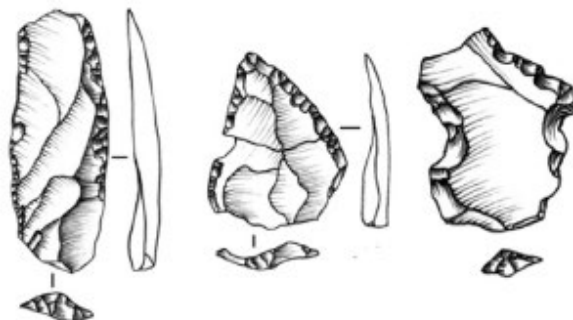
« Core reduction sequences »



End-products with a wide range of determined functional characters



A wide range of retouched tools



Core on block

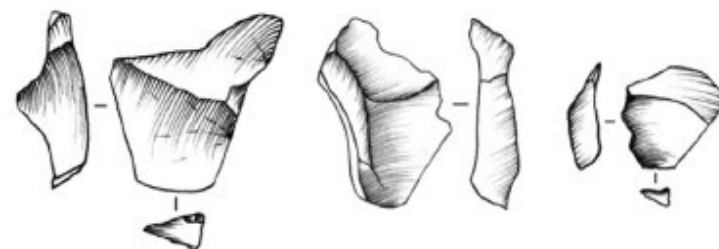


**TCL based on the
CHORDAL DISCOID
flaking system**

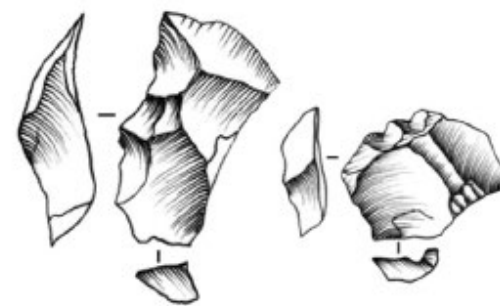
« Core reduction sequences »

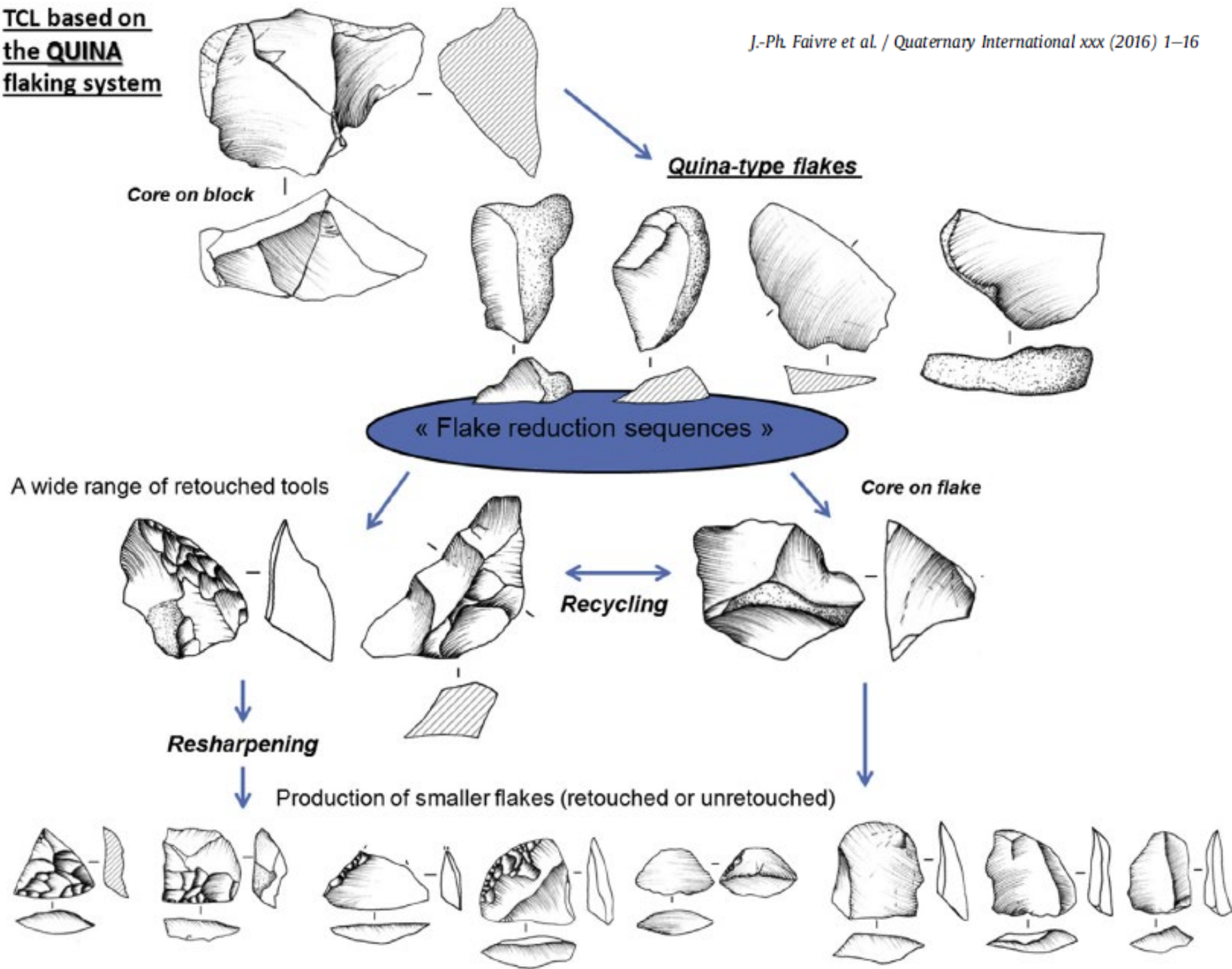


End-products with the same determined functional aspects



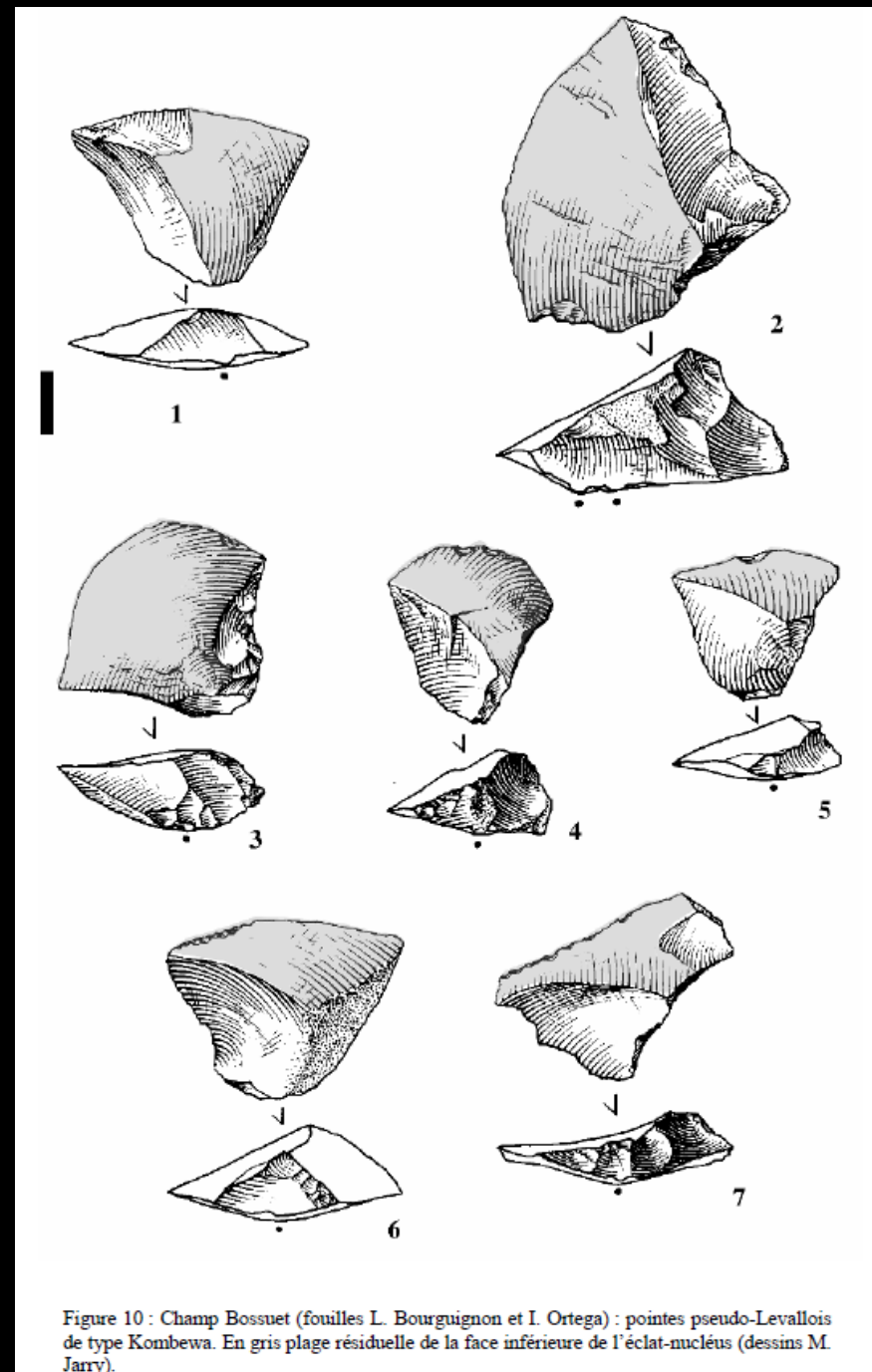
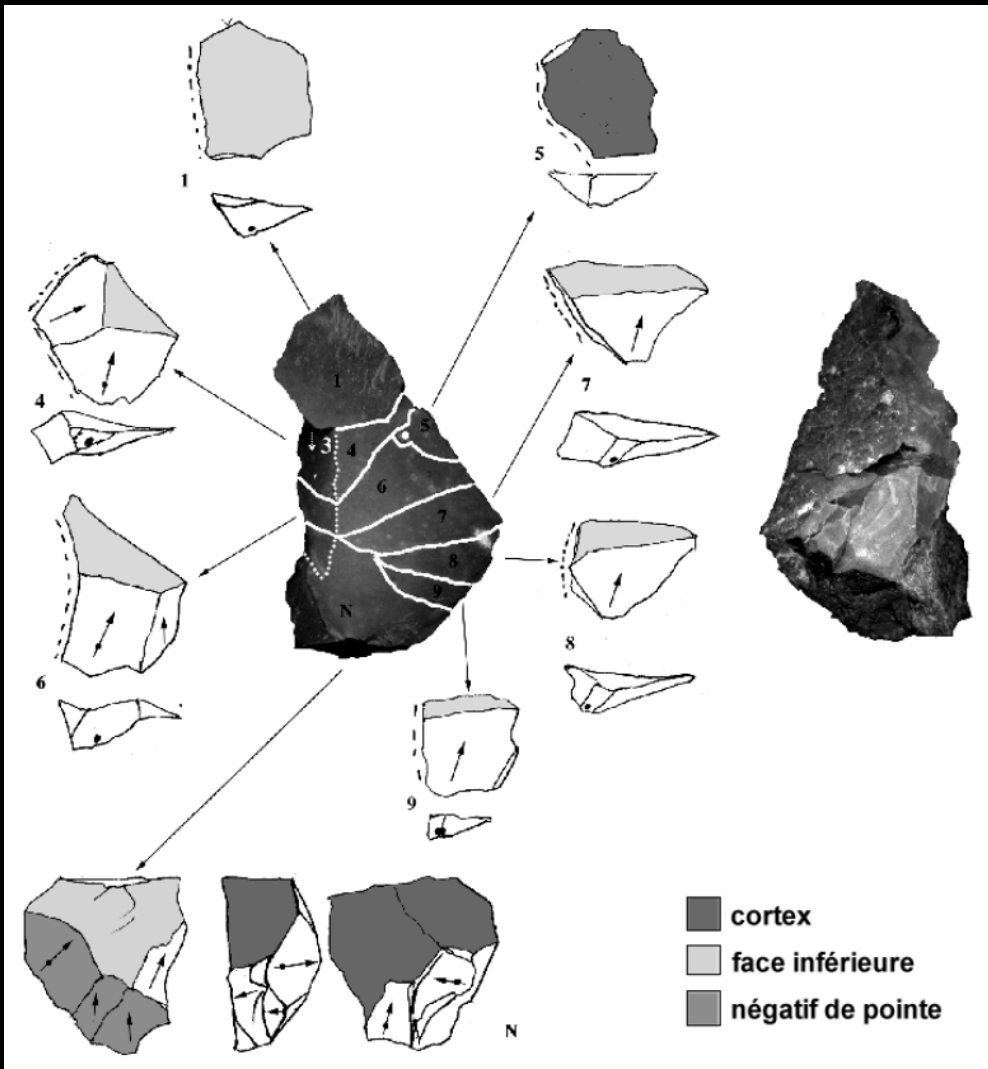
Few and poorly diversified retouched tools





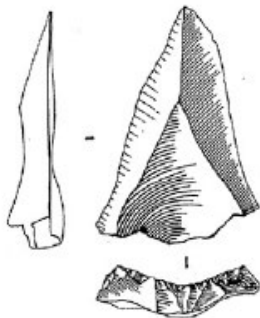
Secondary production

Champ Bossuet



Production organisation Le Pucheuil

Primary production



1



by-products recycling

secondary productions

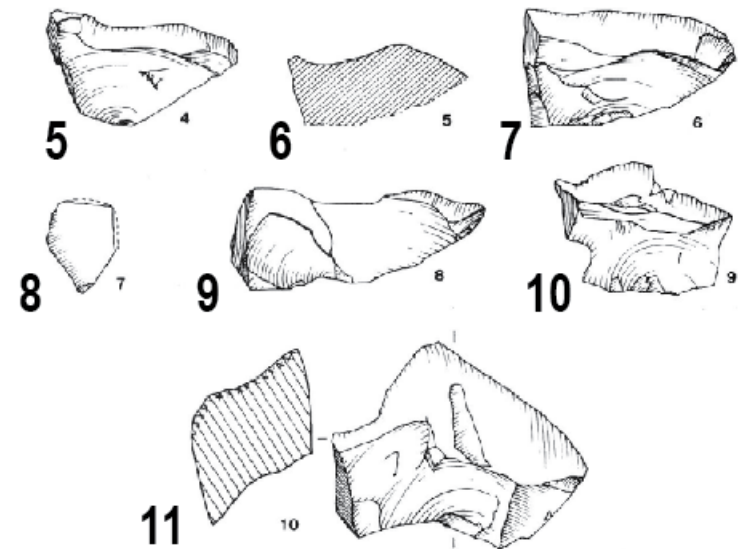
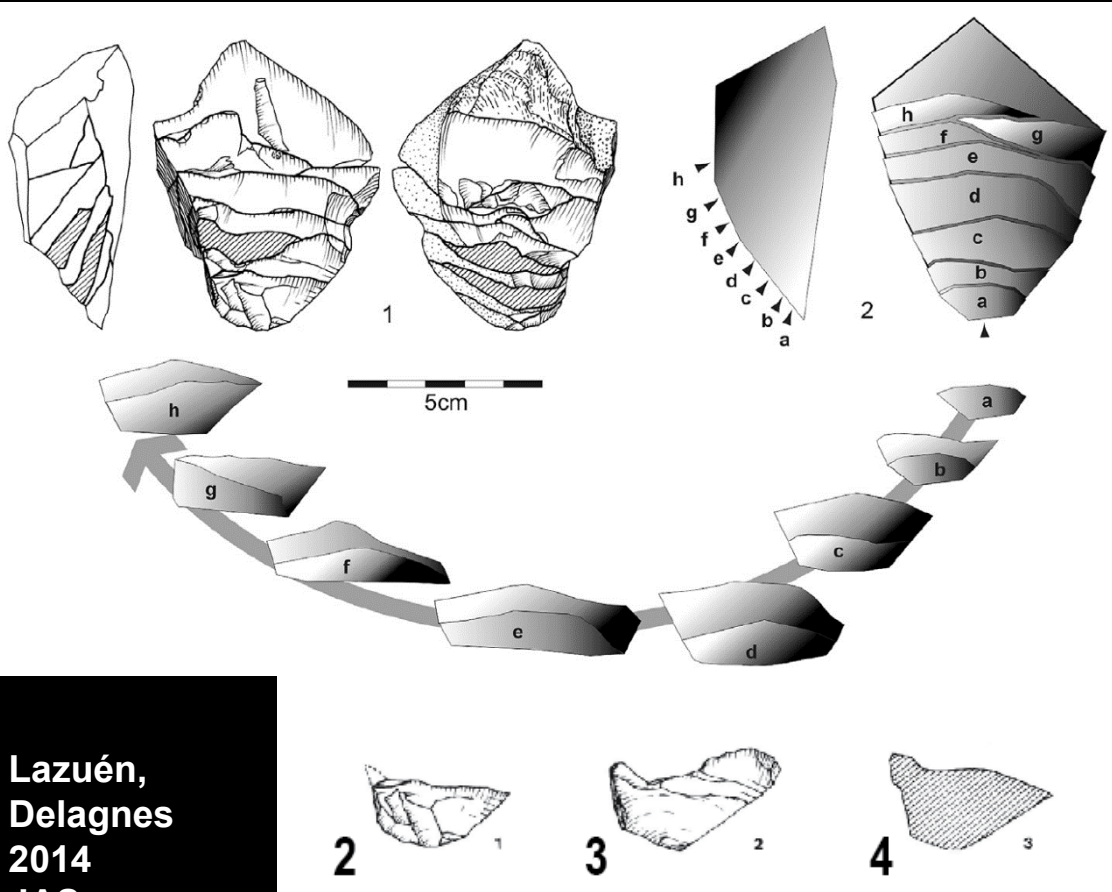
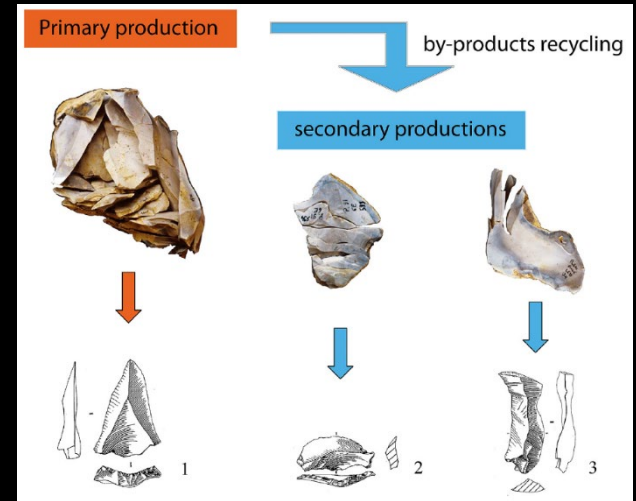


2



3

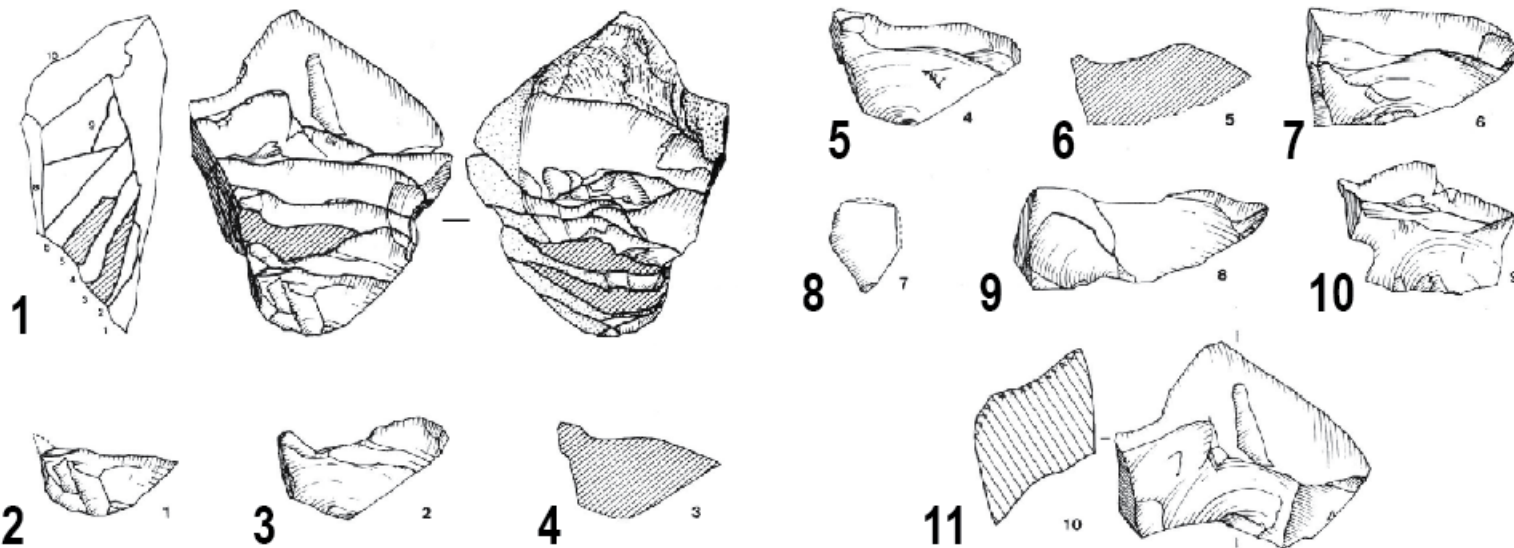
Secondary production Le Pucheuil



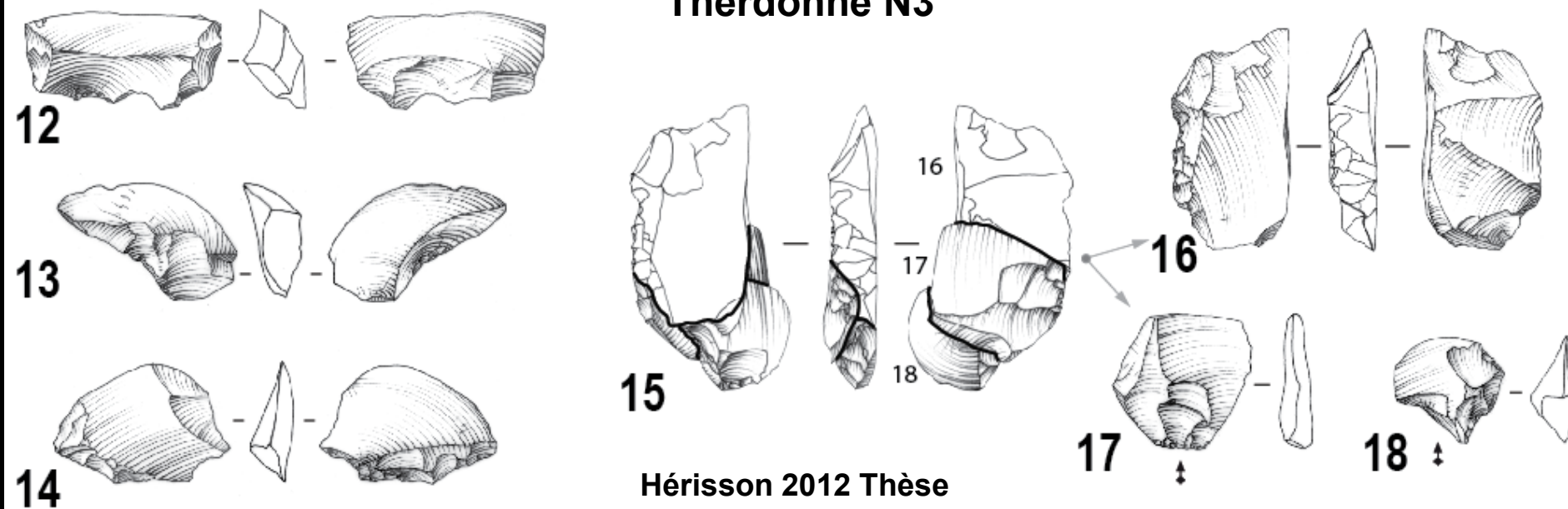
Secondary production

Lazuén,
Delagnes
2014
JAS

Pucheuil série B



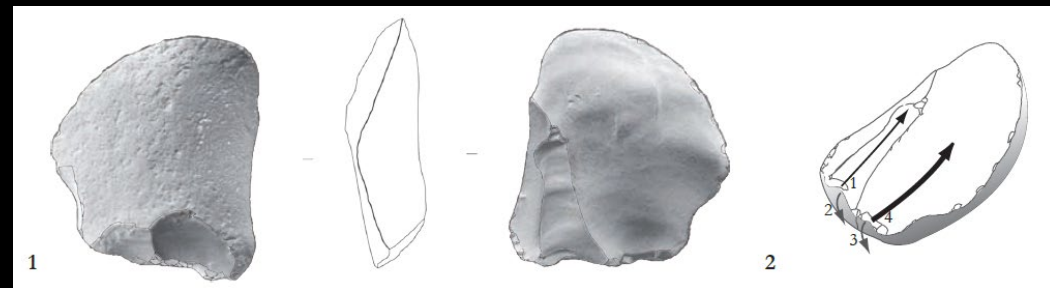
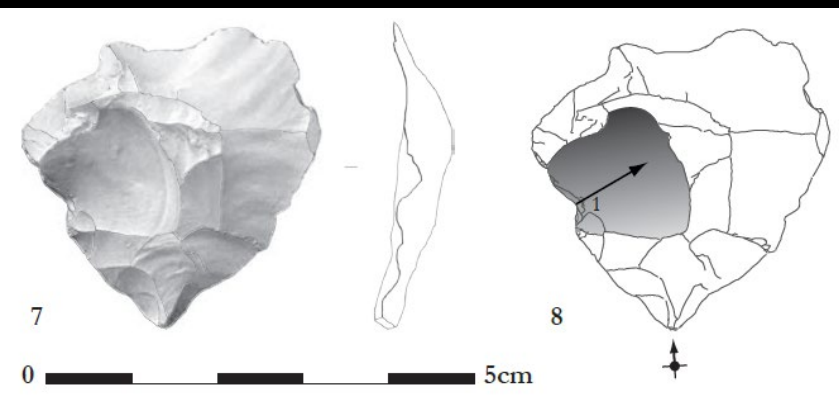
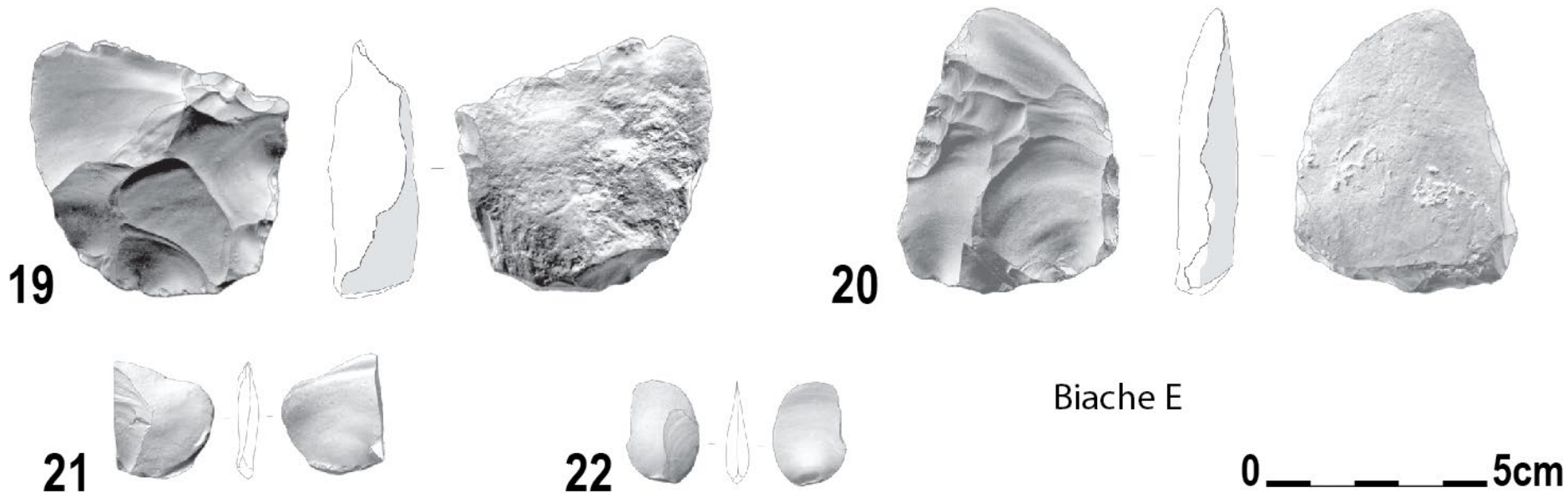
Therdonne N3



Hérissou 2012 Thèse



Secondary production



The Fragmented Character of Middle Palaeolithic Chaînes Opératoires



Journal of Human Evolution
Volume 65, Issue 5, November 2013, Pages 641–655



The fragmented character of Middle Palaeolithic stone tool technology

Alain Turq^a ✉, Wil Roebroeks^b ✉, Laurence Bourguignon^c ✉, Jean-Philippe Faivre^d ✉

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<https://doi.org/10.1016/j.jhevol.2013.07.014>

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MIS 7/6 (191-170ka)



Therdonne

MIS 7/6 (ca 178 ka)

1 occupation 305 m²

46 163 lithic artefacts

156 refittings (544 pieces)

Blocs de
matière
première

Eclats Levallois
préférentiels

Importation

In situ



Déchets de production et outils abandonnés

Exportation



Pointes Levallois

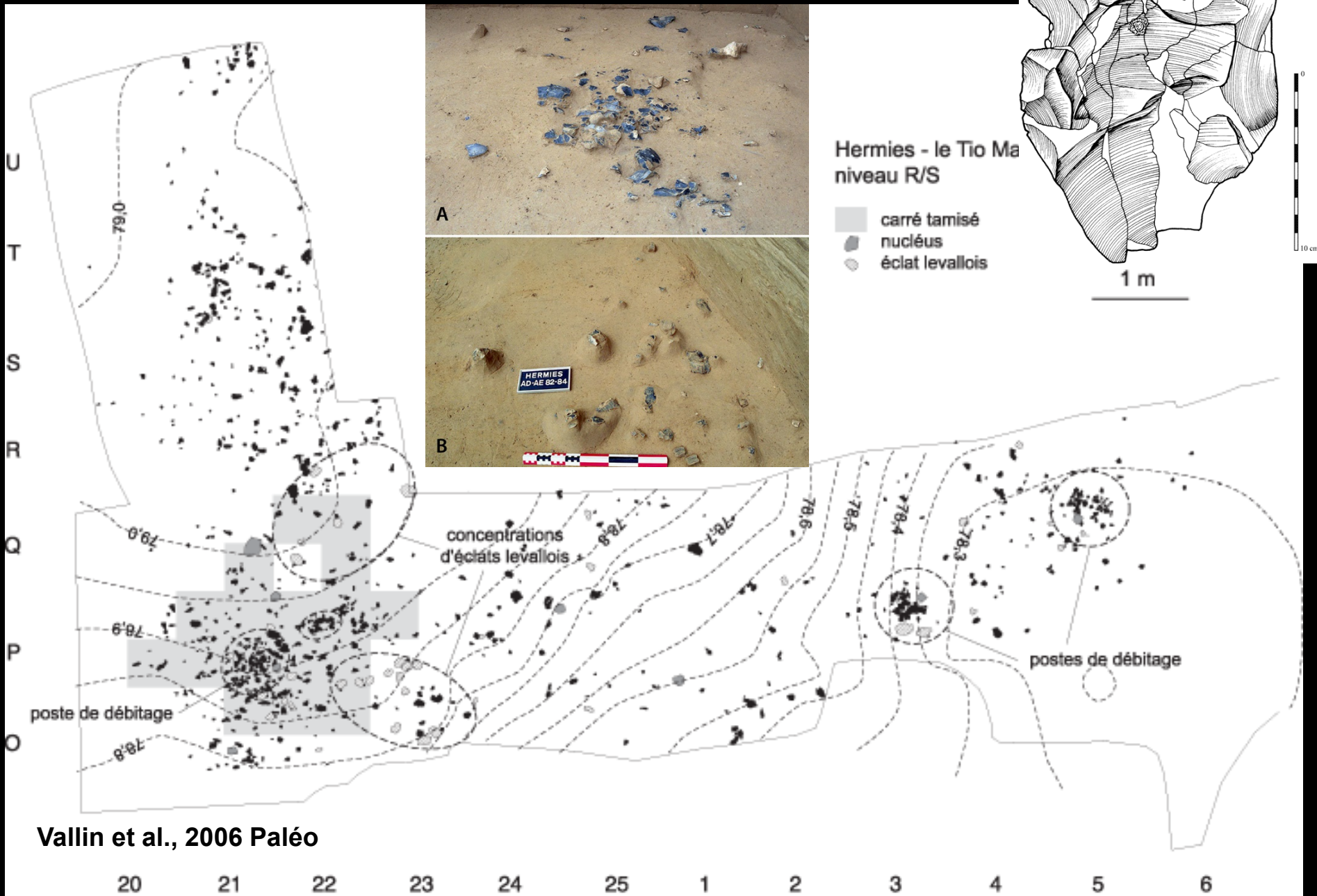


Nucléus Levallois
à pointes



MIS 4/3 : 70-45 ka

Hermies MIS 4 –65 ka L. Vallin dir.



MIS 4/3 : 70-45 ka

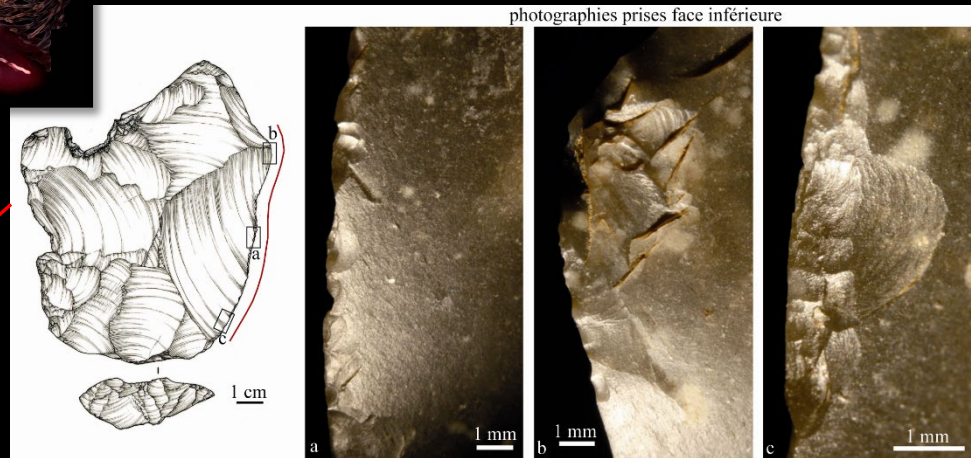
Havrincourt 1 (2010)

MIS 4 –65 ka

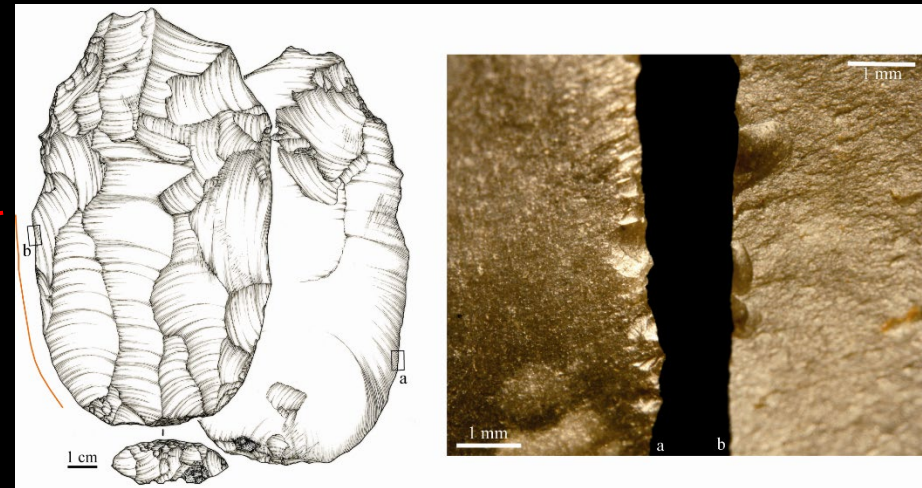
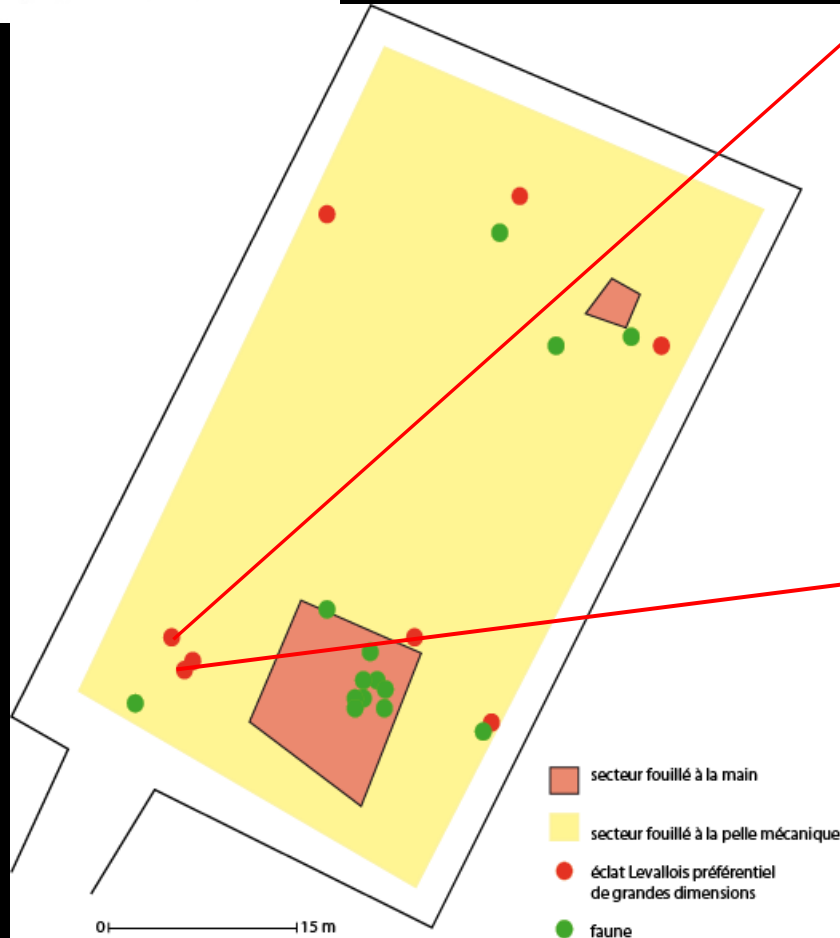
E. Goval dir.



photographies prises face inférieure



Esquillements liés à la coupe de matière tendre à mi-dure (percussion ?)



Esquillements liés à la coupe de matière tendre

MIS 4/3 : 70-45 ka

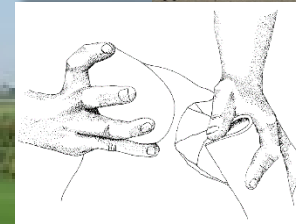
Havrincourt



secteur 1

<2 km

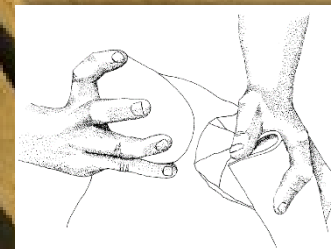
Hermies



400 mètres

secteur 2

Havrinvourt





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