CONTENTS

THE ARCHAEOLOGY OF THE HAUT PAYS (BELGIUM); THE PREHISTORY OF THE HAINE VALLEY UNTIL THE BEGINNING OF THE BRONZE AGE

Irwin Scollar

PREFACE

This work was originally intended to be a short essay illustrating applicability of air photography to archaeology in a region of dense settlement and very diversified ground characteristics. Growing like Topsy, it has since come a long way from the original idea which was inspired by several long talks with one whose name must appear first in a long list of people who have helped, advised and instructed me, O.G.S. Crawford. My thanks for setting me to tread a path which has taught me very much can no longer reach him. Perhaps this work may serve as my small tribute to his memory.

It would not have been possible to carry out the research whose results are presented here without the financial support of a number of institutions: the Metropolitan Museum of Art, New York, whose generosity first enabled me to travel to Belgium; the Belgian-American Educational Foundation which, despite the numerous difficulties which arose, gave its support during my stay there; the American-Scandinavian Foundation, which enabled me to see important comparative material in the North; the Römisch-Germanische Kommission of the German Archaeological Institute which extended to me the full use of its facilities, its hospitality, and its aid in making four study trips to Germany; Prague University which helped make possible my stay in Czechoslovakia; and, finally, Edinburgh University, which provided me with excellent facilities for work during the preparation of this text and the means to make a study trip in Central Europe.

For the fruitful discussions contributing to many of the ideas contained in this paper, I am indebted to Professor Piggott who guided the effort during its crucial stages. On various occasions I have had the pleasure of discussion with, and advice from: Prof. Atkinson, Cardiff; Dr. Baer, Zurich; Prof. Bersu, Frankfurt; Dr. Behrens, Halle; Academician Böhm, Prague; Mr. Bowen, London; Dr. Berlekamp, Dresden; M. Colman, Brussels; Dr. Dauber, Karlsrühe; M. De Heinzelin, Brussels; Prof. De Laet, Ghent; Dr. Driehaus, Mainz; Prof. Garašanin, Belgrade; Miss Houštěva, Brno; Dr. Kaufmann, Halle; Dr. Keller-Tarnuzzer, Frauenfeld; Dr. Maier, Trier; Prof. Marlière, Mons; Prof. Milojčić, Saarbrucken; M. Moisin, Mons; Dr. J. Neustupný, Prague; Dr. E. Neustupný, Most; Dr. Röder, Koblenz; Prof. Sangmeister, Freiburg; Prof. Vaufrey, Paris; Prof. Vogt, Zurich; Dr. Von Uslar, Bonn. All of these have helped me to work out some of the ideas expressed in this paper, and while it cannot be said that they will agree with all that is here presented, each has contributed something to the formation of my synthesis.

To the many people in various institutions who rendered every assistance in the material preparation of this work, I owe a special debt: to M. Cattlin & M. De Saedleer of the Service de Topographie et Photogrammetrie, Ministére des Travaux Publiques, Brussels, together with all the members of their "équipe"; Mr. Amler, Podbořany; Mme. Faider, Musée de Mariemont; Dr. Garscha, Karlsrühe; Mr. Hank, Brno; Dr. Hundt, Mainz; M. Houzeau de la Haie, Mons; Dr. Jorns, Darmstadt; Drs. Mandera & Schoppa, Wiesbaden; Dr. Mathiassen and all the staff, Copenhagen; Mr. Phillips, Chessington;

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Further thanks are to be rendered to those who made field work in Belgium a less onerous task than it was, notably M. Van der Belen, Brussels; M. Liebaers, Brussels; M. Bregenzer and all the members of the Société de Recherche en Préhistorie du Hainaut, M. Daubresse & family, Givry, Mlle. Spitaels, Ghent, and all the inhabitants of the Haine Valley, who by their interest and cooperation helped considerably.

Finally, without my wife's help, criticism, editing, typing and encouragement, it is doubtful that this work would ever have reached its present form.

Heriot, Scotland
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INTRODUCTION

This work is an attempt to study the complete sequence of material cultures in an area of limited extent up to its settlement by metal using peoples. As such it is scarcely an originally conceived project for surveys of this kind exist with greater or lesser thoroughness for many other areas in northern Europe. It is our hope that we will be able to show the local material in a wider setting, to de-provincialize it, and to draw the attention of archaeologists to its general significance. In some instances, this attempt to provide a wider frame of reference for the material has led to consideration in detail of finds far removed from the modest valley which was for some time our home. In this the "tail" often tends to wag the "dog", but it is such a fascinating "tail" that the temptation to deal with it at length could not be resisted, unhappily for the brevity of the work.

The text is divided into four main sections. The first, dealing with Paleolithic finds and their setting in the rather complex geology of the valley, is an attempt, in the light of recent research, to bring some order into a chaotic mass of long-known material. It is by no means a definitive study, for, under the circumstances of inadequate documentation of finds, poorly conducted excavations and similar hindrances, one can but hope to give an indication of the state of the situation.

The discussion of the Mesolithic settlement of the valley is so brief that it scarcely merits a separate chapter, but this is because of the limited nature of the finds themselves.

In the discussion of the Neolithic and Aeneolithic periods, we have tried to shed some new light on some old problems, and the bulk of the effort is devoted to these sections (chapters 6 & 7). The results of our field work and study of correlative material does, accomplish this we hope, though we feel that the scheme outlined in the last chapter is capable of considerable refinement.

The "tail" to our "dog," a discussion of the Michelsberg culture as a whole, was made necessary by a need for precise attribution of our neolithic material. The confusing state of research on the Michelsberg culture, especially with the introduction of a host of new theories in recent years--all founded on what we believe to be insufficient evidence--- made it imperative to review the entire question at first hand. We hope that the results which have been obtained justify the rather extravagant attention to the finds of secondary importance in the area of our survey, for, had we not undertaken the latter, we would never have felt the need for a more precise description of the Michelsberg material.

We have not presented the results of the survey in their geographical context because of any belief in geographical determinism. Rather, we have tried to use the natural setting as a stage upon which a number of different plays have been performed, the actors themselves having written the script and left us but a few discarded programmes. Furthermore, for those unfamiliar with this rather unfrequented corner of Belgium, a certain amount of physical background lends scale, if not substance, to the performance.

All illustrations were drawn by the writer, in the overwhelming majority of cases from the originals in various museums, as noted in the illustration lists. The non-ceramic finds are at a uniform scale of one third.

The pottery was drawn with a camera obscura at varying scales, and hence the actual size of the pot is given in the list accompanying the text. For the air photographs, credit must go to the Belgian Ministry of Public Works, while other photos are by the author.

It was originally hoped to make a ground survey of the entire valley, some 900 square kilometers. When this proved impractical because of time and financial limitations, a cross-section was decided upon, and every field, quarry, wood, etc. in the area of Belgian Military maps 45/5, 45/8, 51/3, 51/4 (approximately 160 square kilometers) was visited over a two-year period. The availability of several sets of total and partial air photo cover materially facilitated the task. A comparison of the density of finds in the surveyed region (shown in figure 35) with the surrounding region will give some impression of the result.

During the course of the survey and museum work, numerous and rich remains from the Iron Age, Roman and early Medieval periods were noted. It is hoped that we may be able to deal with these at some future date. To do so now would grossly extend an already overly long work.

In the text which follows MHN signifies the Musée d'Histoire Naturelle, Brussels; MRC & MRAH signifies the Musées Royaux du Cinquantennaire, later Musées Royaux d'Art et d'Histoire; MM is the Musée Préhistorique de Mons; and AP is the air photo archive of the Service de Topographie et Photogrammetrie of the Ministère des Travaux Publiques, Brussels. SRPH is the Société de Récherche en Préhistoire du Hainaut.

ILLUSTRATIONS

Figures

Figure 3 (cont'd)

6-MHN 8208/60 gray flint with white inclusions, nearly unpatinated, carefully facetted butt and delicate secondary retouch (also reproduced in Breuil 1934, fig. 10, no. 4).
7-MHN 6693/22 black translucent flint, traces of cortex, dulling retouch on convex side, secondary sharpening retouch.
8-MHN 8122/7 café-au-lait color, delicate surface retouch, completely missing bulb, part broken (also reproduced in Breuil 1934, fig. 10, no. 1).

Figure 4 - Finds from the green sands, Hélin quarry.
1- MHN 6280/18 dark brown patina, traces of bulb suppression, thick, deep surface retouch (also reproduced in Breuil 1934, fig. 8, no. 7).
2-MHN 8208/44 light gray flint, unpatinated, facetted butt, possible edge retouch, thin, with thick bulb.
3-MHN 6904/42 unpatinated black flint, cortex intact on one side, fine secondary retouch and hinge fracture on part of bulb end.
4-MHN 6280/17 waster flake, light rose brown flint, traces of orange and green cortex, pronounced bulb (also reproduced in Breuil 1934, fig. 8, no. 4 and erroneously classed with pieces from base gravels).
5-MRC no number, greenish brown patina, straight profile, rolled.
6-MRC no number, green patina, cortex in spots, deep scars in thick surface, rolled.
7-MRC no number, brown patina, cortex intact, rolled.

Figure 5 - Finds from surface of Prêle, Hélin quarry.
1-MHN 6280/2 gray brown matte patina, sharp edges, traces of cortex, wide flake scars, no secondary retouch, thick heavy bulb, striking platform removed.
2-MHN 6904 gray chalky flint, sharp edges, thin.
3-MHN 6280 brown patinated black flint, secondary retouch around edge near remaining bits of cortex, pronounced bulb and scar, obtuse plain striking platform.
4-MHN 6280 greenish patinated cortex, orange in places, flint is brown chalky in color, technique produced blades like no. 3.
5-MM no number.
6-MM no number.
7-MM brown patina, fresh edges, slight secondary retouch at base.
8-MM brown-green patina, deep scars, no retouch, striking platform removed.
9-MM brown patina, fresh edges, thick flake, large bulb, plain striking platform.
10-MM green patina, deep scars, core preparation flake?
11-MM orange-green patina, deep scars, plain butt.
12-MM brown chalky patina, bulb and striking platform missing.
13-MM orange-green patina, large areas of cortex remain on butt, deep scars, wavy S-shaped edge, slightly rolled.

Figure 6 - Finds from the Prêle, the Hélin quarry.
1-MHN 6904 green cortex, red-brown patina with white inclusions, large flake scars with developed negative bulb. Matte surface, rolled.
2-Reverse of above.
3-MHN 6094 cortex preserved, matte red-brown patina, rolled, smooth butt, signs of preliminary flaking on upper surface, angle of striking platform in excess of 120 degrees.
4-MHN 8030 patina as above, smooth butt, rolled, chips on edge due to rolling.
5-MM green-brown patina, wide deep scars, smooth plain butt.
6-MM green-brown patina, cortex largely intact, very heavy negative bulbs, deep scars, rolled.
7-MHN 8090 green-brown patina, thinner than foregoing pieces, signs of use or retouch along edge, trace of facetted striking platform.
8-MHN 8030 black translucent flint, unrolled, traces of cortex, careful retouch along one edge, traces of facetted striking platform.
9-MM green-brown patina, deep scar, trace of cortex, trace of facetted striking platform, rolled.
10-MM wide deep s cars, green-brown patina.
11-MM green-brown patina, unprepared striking platform, cortex on one edge, thick, pronounced bulb.

Figure 7 - The Spiennes-Mesvin Trench, drawn from data in Cornet, Briart, Houzeau 1868, 1872, Delvaux 1891 and modified according to observations in Cornet 1927, with terminology corrected for current usage.

Figure 8 - Finds from the base of the loess, Spiennes-Mesvin trench.
1-MHN 8534/9 cortex on butt, unrolled, black flint with green spots.
2-MHN 8431/2 heavy blackish patina with white spots on one side only, clear flint on reverse. S curved edge and secondary retouch.
3-MHN GN4911 black flint with green-brown patina in spots, traces of dark cortex, unrolled.
4-MHN GN4911 black flint with brown-green inclusions, cortex remaining along one edge and signs of wear opposite.
5-MHN 8432/7 black flint with brown, green and orange inclusions, white cortex on lower half, crude surface retouch, strongly curved flake.
6-MHN GN4911 black flint with Brownish-green inclusions, rare diehedral butt, pronounced bulb and scar, traces of secondary retouch.
7-MM black flint, facetted butt.
8-MM grayish white patina, deep scars
9-MM translucent brown flint, traces of cortex on reverse.
10-MM patina as foregoing, white inclusion in center, deep scars.

Figure 9 - Finds from the Spiennes-Mesvin Trench, weathering horizon below the younger loess.

1-MHN GN 4911 dark brownish green patina, very pronounced bulb, unretouched, very rolled, considerable breakage around edges.
2-MM brown patina, rolled, cortex adheres in spots.
3-MHN 8534/4 brown flint with orange patina in spots, broken, traces of adhering cortex, plain striking platform, very rolled.
4-MHN 4911 dark green patinated black flint, very rolled, covered with bits of cortex in which an orange coarse sandy deposit is imbedded.
5-MHN 4911 brown patina, definite edge retouch, large bulb, attached cortex whitish, little of striking platform remains.
6-MHN 4911 brownish green patina on black flint with surviving white cortex, much broken edges, though definite retouch visible.
7-MHN GN 4911 dark green-brown patina, much rolled, large regular scars, edge retouch, facetted platform, less pronounced bulb than foregoing pieces, large bulb scar.
8-MHN AL6991 white flint with orange-brown patina, very much rolled.
9-MHN 8534/9 black flint with green spots, some remaining cortex, nearly unrolled.
10-MM green-brown patina, very rolled.
11-MM green-brown patina, plain platform, rolled.
12-MM green-brown patina, rolled, plain platform.
13-MM green-brown patina, deep scars, faint trace of facetted platform, slightly rolled.
14-MM brown-orange patina, deep scars, rolled, platform removed.

Figure 10 - Typical sections at St. Symphorien, taken by the author in the old Hardenpont workings.

Figure 11 - Finds from the Hardenpont quarries, lustred flint.

1-MHN 6762 chocolate brown flint, white inclusions, wavy edge, very large scars.
2-MHN 6693 yellow-brown flint, yellowish inclusions, wavy edge, deep scars, faint secondary edge retouch visible on one end.
3-MHN 8028 in quartzite (rare) with light brown patina, sharply curved back, crude working, unpatinated white butt, no edge retouch.
4-MHN 8028 gray flint with green and brown inclusions, white spots, traces of cortex, fine secondary retouch, thin, rolled.
5-MHN 6693/53 green-brown flint, entirely unpatinated on lower side, highly patinated in rich orange-brown on upper surface, secondary retouch in places.
6-MHN 8446/1 gray-green flint with brown patina at edge, coarse inclusion through center, traces of fine calcareous deposit.
7-MHN 8028/79 black flint with chocolate patina, secondary edge retouch, intact cortex on base, broken on one side.
8-MHN 8028 green-brown flint with yellow inclusions, eroded pit on one side has heavy deposit of red-orange coarse sand in it, very wide deep scars.

Figure 12 - Finds from the Hardenpont and other St. Symphorien quarries, matte.

1-MHN 8028 whitish translucent flint with gray brown spots, thin, and with fine delicate secondary retouch all around the edge.
2-MHN 6851 translucent gray flint, with white inclusions, broken, bulb missing.
3-MHN 6028 patina as preceding, cortex preserved in spots.
4-MHN 8028 gray-brown flint with white and black inclusions, unfinished, work being stopped by white inclusion in center which passes through flake, partial secondary retouch, thinning strokes remain unexecuted.
5-MHN 6990/2 dark gray-brown flint with yellow-orange inclusions, strong secondary retouch on convex edge and dulling retouch on straight edge, pronounced bulb and facetted striking platform.
6-MHN 6693 gray-black flint, cortex remaining, retouched along one edge, blunted along other.
7-MHN 8336 brown flint, secondary retouch, slight retouch on straight edge, traces of light colored sand adhere in surface pits, bulb of percussion partially suppressed.
8-MHN 8028.1 gray-green flint with whitish brown inclusions, intact smooth white cortex on one side, bulb sheared off and edges strongly retouched, very thick (over 2cm.).
9-MHN 6693 gray translucent flint with white inclusions, facetted butt and rare bulb suppression strokes on reverse.
10-MHN 8253/2 gray flint with whitish inclusions, cortex on one side, careful edge retouch.

Figure 13- Finds from the St. Symphorien quarries, white lustre

1-MHN 8123/1 gray-blue flint, with white inclusions, traces of cortex, quite spherical, much used.
2-MM white, broken, careful retouch on one edge.
3-MRC from De Loe 1929, fig. 8.
4-MRC from De Loe 1929, fig. 9.
5-MM white, facetted platform, no retouch.
6-MM white, traces of yellow loess in pit on surface, careful edge retouch.
7-MM white, careful denticulated (?) edge, cortex white.
8-MM white, traces of cortex, careful sharpening retouch,
9-MM gray-blue, high lustre, no retouch.
10-MM similar to above.
11-MM white-gray, traces of adhering chalky deposit, facetted platform, large amounts of cortex preserved.
12-MM white, strongly pitted and eolised, loess in pores.
13-MM white, strongly eolised, spots of rust (may be surface find).

Figure 14 - The Mesvin quarries, parcels 296 and 328 (296 shown), after Delvaux 1885 and Cornet 1927, with terminology changed to conform to contemporary usage.

Figure 15 - Finds from the Mesvin quarries, together with two pieces from Nouvelles and Ciply.

1-MHN 5496/4 yellow-blue patina, trace of cortex at butt, inscribed "la base du terrain quaternaire Landenien (sic) Mesvin parc(elle) no 296 à 7 m. de profondeur, 14 janvier 18..(illegible)." Judging from the handwriting, this is the piece referred to in Cornet 1884.

Figure 15 (cont'd)

2-MHN 8920 white patina, traces of reddening, bulb completely suppressed, and careful over-all edge retouch (not drawn), traces of rolling. From the Solvay quarries at Nouvelles (about half a km. from the Mesvin site).
3-MHN 5759/1 white, chalky patina, smooth butt and cortex remaining, labelled "Mesvin, Fond de Rivière".
4-MM smooth white patina, edge retouch, pronounced bulb, facetted striking platform.
5-MHN AL 6991/2 gray white patina, brownish cortex on one side and delicate secondary retouch, completely suppressed bulb, label "Mesvin Chantier B".
6-MHN De Munck 6693/5 blue white patina, slightly S-curved profile, still sharp, fine edge retouch. From the Solvay quarry, Ciply.
7-MHN AL 6991/4 blue white patina, traces of rust, partial edge retouch, slightly rolled.
8-MRC from De Loe 1929, fig. 7.
9-MM patina identical with no. 4, flake scars deep, wide.
10-MM 170 white patina, rolled.

Figure 16 - Finds from the Bernard and Solvay Quarry, Spiennes
1-MHN 5208/39/3 gray-brown flint, whitish inclusions, careful edge and partial surface retouch.
2-MHN 6693 white translucent patina, rolled and somewhat eroded, label lists find place as in a garden near the house of Stevens Delwart on the right bank of the Trouille, under the Camp à Cayaux, which is approximately the location of the Bernard quarry.
3-MHN 5208/7 white crackled patina on gray ground, traces of remaining cortex, label reads "Spiennes village, B(ernard) 1891".
4-MHN 5208/7 traces of reddish orange sand adhere to pit on one edge, label reads "Exp. Bernard, Spiennes", large round scraper has been struck off one side, smaller flakes removed from other.
5-MHN 6693/61 patina identical with foregoing, flint identical with foregoing,(gray-brown), label reads "Exp. Solvay, Spiennes", facetted striking platform.
6-MHN AL 6991 green-brown patina with large flake scars, wavy edge.
7-MHN AL 6991 white chalky patina, light gray unpatinated flint, traces of cortex, slightly rolled, one side with wavy edge.

Figure 17 - Section of the Ciply Quarries, after field observation by the author confirming unpublished section of De Heinzelin in MHN archives.

Figure 18 - Finds from the Chemin de Mesvin, Spiennes
1-MHN 8333
2-MHN 8208
3-MHN 8325
4-MHN no number
5-MHN 8431
6-MHN 8534
7-MHN 8386
8-MHN 8386
9-MHN 8532
10-MHN 8532

Figure 19 - Finds from the "Ancien Houillier" of Harmignies and from the surface south of Vellereille-le-Sec.

1-MHN HaMo 545	Harmignies	
2-MHN 8253	"	
3-MHN HaMo 216	"	
4-MHN HaMo 545	"	
5-MHN haMo 217	"	
6-MHN no number	Vellereille	
7-MHN 8064	"	
8-MHN 8431	"	
9-MM no number	"	
10-MM no number	"	
11-MHN 6384(?)	"	
12-MM no number	"	
13-MM no number	"	
14-MHN 8253	"	
15-MHN 8208	"	
16-MM no number	"	Houzeau collection
17-MM no number	"	" "
18-MM no number	"	" "

Figure 20 - Section of the P.A.B.H. quarry, Harmignies, field observation by the author.

Figure 21 - Finds from Vellereille-le-Sec, Estinnes, Bray.

1-MHN 8253
2-MHN 8386
3-MHN 8208
4-MHN 8253
5-MHN 8386
6-MHN 8064
7-MHN number illegible
8-MHN 8208
All from Vellereille

9-MHN 8253	Estinnes-au-Mont
10-MHN 8253	Estinnes-au-Val
11-MHN 8253	" " "
12-MHN 8253	Estinnes-au-Mont
13-MHN 8253	Bray
14-MHN 8253	"

Figure 22 - Finds from Asquillies, all MHN 6693

Figure 23 - Finds from the Bois de Mons and Mont Panisel, Mons-Beau-Val

1-5 All Mons Museum, no numbers, Mont Panisel
6-MHN 8334 Mons Beau-Val
7-MHN 8208 Mont Panisel
8-MHN 8334 Mons Beau-Val
9-MHN IG 3920 Persenaire coll.
10-MHN 8292 Bois de Mons

Figure 24 - Finds from Flénu and Cuesmes

1-5 MHN GN 4911 Flénu
6-MHN 7009 Cuesmes, label reads "Base du limon à 3 metres Exp. Rolland"

Figure 25 - Section of the Craibel Quarry-Cuesmes (formerly the Rolland quarry, after author's observation and De Heinzelin, in archives of MHN, unpublished.

Figure 26 - Finds from Obourg-St. Macaire and Obourg-Bosquetiau

1-MHN 8064 Obourg-St. Macaire
2-MHN 6693 " " "
3-MHN 6693 " " "
4-MHN 8064 " " "
5-MHN 8064 " " "
6-MHN 6693 " " "
7-MHN 8064 " " "
8-MHN 6774 Obourg-Bosquetiau
9-MHN 8064 " "
10-MHN 8064 " "
11-MHN 8235 " "
12-MHN 8064 " "

Figure 27 - Finds from Mons Beau-Val, St. Denis-Esplasse, Mons

1-MM Mons Rue d'Obourg, 1949
2-MHN 8334 Mons Beau-Val
3-MHN 5496 Mons "Ecluse de la porte du jour"
4-MHN 8334 Mons Beau-Val
5-MHN 8334 " " "
6-MHN 8334 " " "
7-MHN 8253 " " "
8-MHN 8253 " " "
9-MHN 8253 " " "
10-15 MHN 6693 St. Denis-Esplasse

Figure 28 - Finds from Ghlin, Baudour, Hyon, Nouvelles, Mons

1-2 MHN 5496 Ghlin
3-MM Nouvelles
4-6 MHN 8324 Baudour-Douvrain
7-MHN 5496 " "
8-MM Hyon, Jardin Colonna 1900
9-MHN FC 5496 Baudour-Douvrain
10-14 MM Mons, "Chemin de la Justice"

Figure 29 - The Angreau tramway trench, after Ladrière 1890 Pl. 1, with terminology changed to conform to modern usage.

Figure 30 - Finds from Ciply, Harmignies-La Ligne, Angreau Trench, Quevy-le-Grand, Stambruges (Butte de Calvaire, Carrière Amoison).

1-Mariemont Museum, Morlanwelz; Ciply, no find data
2-MM Harmignies-La Ligne (found by the author)
3-4 MHN 6711/33 The Angreau Trench
5-MM Quevy-le-Grand, Bonnet, 400 mtrs. from Mons-Mabeuge road (found by the author)
6-8 MHN 6711/33 The Angreau Trench
9-13 MHN IG 8991 Stambruges

Figure 31 - Section of sand pit on Butte de Calvaire, Stambruges, taken by the author, and with supplementary data from sections by De Heinzelin and an unknown author in the archives of the MHN.

Figure 32 - Distribution Map of Mesolithic Sites and Finds in the Haine Valley.
1-Obourg--Hamburgian site in Bois St. Macaire ref. Letocart 1956
2-Bois Abrassart, Harmignies
3-Maglemose Harpoon found at Pommeroeul in 1839, now MM
4-Maglemose Harpoon found at Obourg-Ferme des Wartons, now MHN 6693/945
5-Mons Beau-Val, finds in MHN labelled "Azillian" (Maglemose)
6-Spiennes Tardenoisian finds, MM
7-Obourg flint mines, surface workings in Mesolithic
8-Obourg-Beau-Val, Tardenoisian
9-Stambruges-Grotte des Fées
10-Mons Port-du-Parc, Maglemosian, MM

Figure 33 - Finds from the excavations by the SPRH Mons, at Obourg, Bois St. Macaire, 1955-1956.

Figure 34 - Mesolithic finds from various sites.
1-7 MHN 8064 Mons, Beau Val
8-13 MM Spiennes, near Rivière de Nouvelles
14-18 MM Obourg (in flint mine area)
19-20 MM Harmignies, Bois Abrassart, surface finds (by the author)

Figure 35 - Distribution Map - The Neolithic and Early Bronze Age.
Map ref. 45/7
1-Flints, ref. De Loe and De Munck 1890 and Mons Museum
2-EBA hoard, copper axe, greenstone axe, small copper scraps, ref. Mons Museum and Moisin, Cadastral parcel B1326 F3
3-Isolated neolithic axe, ref. De Loe and De Munck 1890 and MHN
4-Flint workings, ref. De Loe and De Munck 1890, AP's, Mons Museum, MHN, MRAH
5-Flints, ref. Survey Finds (Mons Museum)
6-Flints, ref. De Loe and De Munck 1890, Mons Museum
7-Great quantity of flint, axes, etc., possible habitation, ref. De Loe and De Munck 1890, Mons Museum, MHN, MRAH
8-Flint workings (Trou des Sarrasins) destroyed, ref. De Loe and De Munck 1890, MHN
9-Flints, ref. De Loe and De Munck 1890, MHN, MRAH
10-Flints, ref. De Loe and De Munck 1890
11-Flints, collection Houzeau de la Haie (Mons Museum)
12-Flints and possible habitation, ref. De Loe and De Munck 1890, Mons Museum, MHN
13-Flint, ref. De Loe and De Munck 1890
14-Flints, ref. Survey Finds (Mons Museum)
94-Flints, ref. Survey Finds (Mons Museum)

Map ref. 45/8

15-Flints, ref. Mons Museum, MHN, MRAH
16-Flints, ref. Survey Finds (Mons Museum)
17-Flint Mines, ref. AP's, Le Francq and Moisin 1955, Mons Museum; the Spiennes section was taken along the railroad trench running two hundred meters to the south of this point.

Figure 35 - map ref. 45/8 (cont'd)

18-Flint Mines, Camp or Enclosure, ref. AP's, Scollar 1955, Survey Finds (Mons Museum)
19-Flint Mines, The "Camp à Cayaux", refs., see text
20-Flint Mines, refs. AP's.
21-Flints, Survey Finds (Mons Museum)
22-Flints, Survey Finds (Mons Museum)
23-Flints, Survey Finds (Mons Museum)
24-Flints, ref. De Loe and De Munck 1890
25-Axe, Survey Finds (Mons Museum)
26-Flints, Survey Finds (Mons Museum)
27-Axe, Survey Finds (Mons Museum)
28-Flints, Survey Finds (Mons Museum)
29-Flint Mines, ref. AP's.
30-Circular Enclosure, ref. AP's
31-Flints, Survey Finds (Mons Museum)
32-Flints, Survey Finds (Mons Museum)
33-Flints, Survey Finds (Mons Museum)
34-Megalith of St. Symphorien (Mons Museum), find spot according to notebooks of J. Houzeau de la Haie.
35-Flints, Survey Finds (Mons Museum)
36-Flints, Survey Finds, also coll. Houzeau, Mons Museum
37-Complex of flints, some Neolithic, some Mesolithic; also quarry finds, Survey Finds (Mons Museum); also coll. MHN, MM, MRAH
38-Flints, ref. De Loe and De Munck 1890, MHN, Mons Museum
39-Flints, Axes, ref. De Loe and De Munck, collection Daubresse, Givry
40-Flint Axes in Roman Graves, Haulchin Cemetery, Le Tombois, ref., Mariemont Museum, Morlanwelz, Hainaut
41-Flake Axe, Survey Find (Mons Museum)
42-Flints, Axe fragment, Survey Finds, Mons Museum
43-Flint Mines, refs. De Loe and De Munck 1890, AP's, Mons Museum
44-Flints, ref. De Loe and De Munck 1890, Mons Museum and Survey Finds (Mons Museum); also some in MHN
45-Axe fragment, Survey Find (Mons Museum)
46-Flints, Survey Finds (Mons Museum)
47-Flints, ref. De Loe and De Munck 1890, MHN
48-Flints, Axes, ref. De Loe and De Munck 1890, MHN
49-Flints, ref. De Loe and De Munck, MHN, MRAH
50-Flints, parcel 123 (found by Moisin) unpubl. Mons Museum
51-Flints, ref. De Loe and De Munck 1890, MHN
52-Flints, ref. De Loe and De Munck 1890, Mons Museum, Survey Finds (Mons Museum)
53-Flints, Michelsberg Pottery, ref. De Loe and De Munck 1890, MHN (Carrière Hardenpont)
54-Flints, ref. De Loe and De Munck 1890, MHN, MRAH
55-Flints, Survey Find, (Mons Museum)
56-Flint, Survey Find, (Mons Museum)
57-Flints-Survey Find, (Mons Museum)
58-Flints, Survey Finds (Mons Museum)
59-Flints, Mons Museum
60-Flints, Survey Finds (Mons Museum)
61-Flints, ref. De Loe and De Munck 1890
62-Flints, Survey Finds (Mons Museum)
63-Flints, Survey Finds (Mons Museum)
64-Flints, Survey Finds (Mons Museum)
65-Flints, Survey Finds (Mons Museum)
66-Flints, Survey Finds (Mons Museum); also old finds, coll. Houzeau, Mons Museum
93-The Megalith of Haulchin found, according to J. Houzeau at "L'Aulnois" at or near the southern limit of the commune. Megalith now stands in front of the school at Haulchin.

Figure 35 - map ref. 51/3

67-Flints, Survey Finds (Mons Museum)
68-Flints, Survey Finds (Mons Museum)
69-Flints, Survey Finds (Mons Museum)
70-Arrow point, Survey Find (Mons Museum)
71-Reported find of Megalith, ref. De Pauw and Hublard 1906, but find is lost and may have been erratic in Tertiary sand formation on site.
72-Flints, Survey Finds (Mons Museum)
73-Flints, Survey Finds (Mons Museum)
74-Flints, Survey Finds (Mons Museum)
75-Flints, Survey Finds (Mons Museum)
85-Flints, Survey Finds (Mons Museum)

Map ref. 51/4

76-Flints, ref. De Pauw and Hublard 1906, and Survey Finds (Mons Museum)
77-81 - Flints, ref. De Pauw and Hublard 1906.
82-Flints, Survey Finds (Mons Museum)
83-Megalith (?) La Pierre à Pagnons, ref. De Pauw and Hublard 1906 (destroyed)
84-Flints, Survey Finds (Mons Museum)
86-Flints, Survey Finds (Mons Museum)
87-Flints, ref. De Pauw and Hublard 1906
88-Flints, ref. De Pauw and Hublard 1906
89-Flints Survey Finds (Mons Museum)
90-Flints, ref. De Pauw and Hublard 1906; finds, ref. De Loe 1929 and MRAH; possible camp, ref. AP's
91-Flints, ref. De Pauw and Hublard 1906
92-Flints, ref. De Pauw and Hublard 1906
95-98 - Flints, ref. De Pauw and Hublard 1906, Survey Finds (Mons Museum), Houzeau
99-Flints, Survey Finds (Mons Museum)
100-Flint Mines, ref. De Munck 1890
101-"Foyer", ref. Cornet 1872.
102-Flint site, Survey Finds (Mons Museum); coll. G. Devier, Villiers St. Ghislain
103-Flints "Motte de Vellereille", Survey Finds (Mons Museum) and coll. Houzeau
104-Megalith Bray (destroyed), ref. Lejeune 1875.
105-152 - Flint sites, ref. De Loe and De Munck 1890
153-185 - Flint sites, ref. De Pauw and Hublard 1902/3
186-192 - Flint sites, ref. Habourdin 1898

Figure 36 - Sections at Spiennes, after Cornet 1872, 1903, Delvaux 1891, with contemporary terminology.

Figure 37 - Flint Mine types, all selected from pieces in Mons Museum.

Figure 38 - Flint types of purely local importance, represented in most of the surface scatters, selected from pieces in the Mons Museum, with the exception of no. 8 in the MHN .

Figure 39 - Projectile points of various periods (Mesolithic through EBA) selected from examples in the Mons Museum and in several private collections in the locality.

Figure 40 - Imported and Exported Axes (rock determinations by mineralogical section, Institute Royal des Sciences Naturelles, Brussels
1-MHN 5496 Flénu, Melaphyrique Tuffa of Saxo-Thuringian type, density 3.35
2-MM surface find, Spiennes, 1953, ref. Adam et.al. 1955 micaschist of Vosges type or Rhineland massif
3-Found at St. Symphorien, Cernau, cadastral parcel 123, September 1951 and now in the Ecole Communale at St. Symphorien, no rock determination made.
4-5 Stray finds, Ghlin, quartzite, now in Mons Museum
6-Flint gouge, now in MRC
7-MHN 6990 St. Symphorien, uralitised augite with opaque mineral inclusions of undetermined nature, density 3.04
8-MHN 4911 quartzite
9-MHN 8336/12 St Symphorien pink flint of unknown provenance
10-14 Spiennes flint export pieces. All examples except 12 in Mons Museum. No. 12 in a private collection.
Figure 41 - Bone types from Spiennes;pieces in MRC, MM and MHN.
Figure 42 - Aeneolithic finds from the Haine valley (excluding arrowheads)
1-MHN 6391 Mesvin Ecolgite, documentation MHN reserves HaMo 188
2-MHN HaMo 289 6991 Spiennes typical jadeite, density 3.34
3-Dagger in Grand Pressigny Flint, found on the surface at Spiennes in 1864, now in the possession of A. Houzeau (grandnephew of A. Houzeau of Cornet, Briart, Houzeau 1872), L'Ermitage, St. Symphorien
4-5 MM, joint find, part of EBA hoard, Jemappes, cadastral parcel B 1326 F3, greenstone axe of square section, north German type, and flat copper axe. Determinations unpublished.
6-MRC Casteau-Maisières in flint, which does not appear to be of the region,
7-MHN AL 6991 Bois d'Haine 1882 in Spiennes flint
8-MM in Spiennes flint
9-MRC 22
10-MRC 6
11-MHN 3
12-MRC 28
13-MRC 24
14-MHN 22
15-16 MHN 63
17-MHN 12
18-MHN 12
19-MHN 63
20-MHN 50
21-MHN 34

Figure 43 - Distribution map of Michelsberg Culture. (Points are not numbered because of scale considerations.).

Figure 44 - The Belgian Group MRAH-Musées Royaux d'Art et d'Histoire, Brussels
(formerly MRC-Musees Royaux du Cinquantenaire)
MHN-Musée d'Histoire Naturelle, Brussels
1-MRAH Spiennes d. 20 cm. infrequent
2a-MRAH Spiennes d. 24.5 cm. common

Figure 44 (cont'd.)

2b-MHN Spiennes HaMo 119/9 h. 16 cm. rare
2c-MHN St. Symphorien 6693 Exp. Hardenpont d. 34 cm. rare
3-MRAH Spiennes d. 25 cm. common
4a-MRAH Spiennes h. 18 cm. common
4b-MRAH Spiennes h. 12 cm. infrequent
4c-MRAH Boitsfort h. 13 cm. infrequent
4d- MRAH Spiennes h. 15 cm. common
4e- MRAH Spiennes h. 11 cm. infrequent
4f- Lommel Museum-Lommel-Kattenbos h. 15 cm. common
4g-St. Niklaas Museum-Zwijndrecht-Vlaams Hoofd h. 14.5 cm. common
4h-MRAH Spiennes h. 15 cm. common
4i-Antwerp Museum h. 16 cm. common (after De Laet 1958)
5-MHN Furfooz, Trou de Frontal h. 37 cm. infrequent
6-MRAH Spiennes h. 18 cm. rare
7-MHN Spiennes HaMo 119/63 d. 5.6 cm. infrequent
8a-MRAH Spiennes h. 47 cm. common
8b-MRAH Spiennes h. 25 cm. infrequent
8c-MRAH Spiennes h. 40 cm. common

Figure 45 - The Rhineland-North Hesse Group
Bonn-Landesmuseum Bonn
Mayen-Schlossmuseum Mayen
Koblenz-Stadtmuseum Koblenz

1-Bonn 20299a Mayen d. 6.6 cm. rare
2-Bonn 20312a Mayen d. 36 cm. common
3-Bonn 38,1316a Kärlich h. 13 cm. rare
4-Bonn 38,1316g Kärlich h. 10 cm. infrequent
5-Bonn 17887 Urmitz d. 16 cm. rare
6-Bonn 43,234 Kärlich h. 27 cm. common
7-Bonn 38,1314e Kärlich h. 15.5 cm. infrequent
8a-Mayen 763a Mayen Erdwerk d. 24 cm. common
8b-Bonn 21936 Mayen d. 16.5 cm. common
8c-Bonn 20304 a-d Mayen d. 11.5 cm. common
8d-Kassel-Altenberg/Niedenstein after Müller-Karpe 1951, pl. 17 infrequent
9-Bonn 14165b Urmitz h. 15 cm. rare
10-Bonn 15547 Urmitz h. 7 cm. infrequent
11-Bonn 20299e Mayen d. 18 cm. infrequent
12-Bonn 20299b Mayen d. 7 cm. common
13a-Bonn 42,385a Urmitz h. 20.5 cm. common
13b-Bonn 38,1312 Urmitz h. 9.2 cm. infrequent
13c-Bonn 20301a Mayen d. 11 cm. common
13d-Bonn 38,1314e-f Kärlich d. 14.5 cm. common
14-Bonn 15622 Urmitz h. 31 cm. rare
15-Koblenz-Urmitz (d) after Gunther 1925, fig. 9, no. 1, h. 30 cm. common
16-Bonn 13330 Urmitz d. 18 cm. at mouth rare

Figure 46 - The Classical Group
Karlsruhe-Badisches Landesmuseum Karlsruhe, temporary depot
Stuttgart-Württembergisches Landesmuseum, Vor-und-Frühgeschichtlichen Abteilung, Stuttgart
Frankfurt-Frankfurt Stadt Museum für Ur-und-Frühgeschichte
Mainz-Stadt Museum Mainz, temporary depot

Figure 46 (cont'd)

Wiesbaden-Landesmuseum Nassauischer Altertümer, Wiesbaden
Worms- Stadt Museum, Worms
Bruchsal-Kreismuseum Bruchsal, temporary depot
Darmstadt-Landesmuseum Süd-Hessen, Darmstadt
RGZM-Römisch-Germanische Zentral Museum zu Mainz

1a-Karlsruhe C 7389 Michelsberg h. 39 cm. common
1b-Stuttgart Neckargartach (d) after Paret 1935/8 pl. 8 h. 38 cm. infrequent
1c-Karlsruhe C7387 Michelsberg h. 35 cm. common
1d-Stuttgart Neckargartach (d) after Paret 1932 pl. 1 h. 20.5 cm. rare
2-Karlsruhe C 7380 Michelsberg h. 21.5 cm. common
3a-Stuttgart 29045 Goldberg h. 23 cm. infrequent
3b-Frankfurt alpha 18327 Praunheim d. 18 cm. Infrequent
4-Mainz-Ingelheimer Wald (d) after Reinecke 1900a h. 16.5 cm. rare
5a-Frankfurt alpha 18327 Praunheim h. 17.5 cm. common
5b-Wiesbaden 18,73 Schierstein h. 21 cm. infrequent
5c-Stuttgart A 31/69 Neckargartach-Hatzenberg h. 12.5 cm. rare
5d-Bruchsal-Auberg h. 15 cm. rare
5e-Worms 522 Niederingelheim h. 15 cm. infrequent
5f-Karlsruhe C5976 Michelsberg h. 23.5 cm. common
5g-Karlsruhe C8294 Michelsberg h. 21.5 cm. common
5h-Karlsruhe C7383 Michelsberg h. 16.5 cm. infrequent
5i-Darmstadt Gross Umstadt h. 21.5 cm. infrequent
5j-Ulm-Ehrenstein (i) after Paret 1955, no scale
5k-RGZM-Schierstein h. 19.5 cm. common, no number

Figure 47-(Classical Michelsberg continued)

Alzey-Kreismuseum Alzey

6a-Karlsruhe C7390 Michelsberg h. 22.5 cm. rare, ornament restored
6b-Karlsruhe C5971 Michelsberg h. 20 cm. infrequent
6c-Karlsruhe C5981 Michelsberg h. 19 cm. rare, ornament restored
6d-Karlsruhe-Staatl. Amt für Denkmalpflege-Heidelsheim h. 19 cm. infrequent
7-Karlsruhe C7391 Michelsberg h. 15.5 cm. rare
8a-Karlsruhe C8292 Michelsberg h. 22.5 cm. rare
8b-Karlsruhe C7393 Michelsberg h. 9.5cm. rare
8c-Frankfurt-Praunheim (i) h. 17 cm. after Fundchronik, Ger 17 1933 14 fig. 4
9-Mainz 26,316 Wörrstadt h 12.5 cm. rare
10-Mainz 9,1522 Ingelheim h. 8.2 cm. infrequent
11-Wiesbaden 18,65 Schierstein h. 15 cm. rare
12-Karlsruhe C8275 Michelsberg d. 12.5 cm. common
13-Wiesbaden 14,84 Adolfshöhe d. 24 cm. infrequent
14-Karlsruhe C7409 Michelsberg d. 25 cm. infrequent
15-Wiesbaden 14514 Schierstein d. 21 cm. common
16-Alzey N53,2 Alzey-Wartberg h. 14.5 cm. infrequent
17-Karlsruhe C9211 Michelsberg h. 32.5 cm. common
18-Darmstadt A1948:173 Büttelborn d. 24 cm. at mouth rare
19a-Mainz 1926 Finthen, Donnersberg h. 34 cm. common
19b-Wiesbaden-Schierstein d. 50 cm. at mouth common
19c-Bruchsal 4907 Michelsberg h. 28 cm. common

Figure 48 - (Classical Michelsberg continued)
Speyer-Historisches Museum der Pfalz, Speyer
20a-Alzey 53,4 Alzey-Wartberg d. 24.5 cm. at mouth common
20b-Speyer-Iggelheim h. 23 cm. infrequent
21-Karlsrühe C5694 Michelsberg h. 32.5 cm. infrequent
22a-Wiesbaden 18,81 Schierstein length 18.5 cm. common
22b-Wiesbaden 18,80 Schierstein h. 9 cm. rare
22c-Worms 522 Monsheim length 17 cm. rare
23a-Karlsrühe C5966 Michelsberg d. 38 cm. common
23b-Mainz 54/29 Hechtsheim d. 29 cm. infrequent
23c-Stuttgart 1733/86 Goldberg d. 32 cm. common
23d-Alzey N46 Neubamberg, Galgenberg d. 23 cm. common
23e-RGZM 0,1161 Michelsberg d. 31.5 cm. common
23f-Karlsrühe C5975 Michelsberg h. 21 cm. common
24-Bruchsal-Auberg (d) after Wahle 1925, p. 56 d. 22 cm.
25a-Karlsrühe C8273 Michelsberg h. 23.5 cm. common
25b-Wiesbaden 18,102 Schierstein h. 16 cm. common
25c-Wiesbaden 19,93/1 Flörsheim h. 24 cm. rare

Figure 49 - Alsace-South Baden Group
Strasbourg-Musée Archéologique de Strasbourg
Freiburg-Städt Sammlungen, Abt. Museum für Ur-und-Frühgeschichte
1-Strasbourg 40593 Lingolsheim d. 16 cm. at mouth rare
2-Strasbourg 17373.1 Lingolsheim h. 30.5 cm. common
3-Strasbourg 16286 Höhnheim h. 23 cm. common
4a-Freiburg 39:21c Kleinkems h. 23 cm. rare
4b-Freiburg 54/208 Munzingen h. 16.5 cm. infrequent
5a-Strasbourg 33495 Lingolsheim h. 29 cm. common
5b-Strasbourg - Cronenbourg h. 32 cm. rare (lugs)
6a-Strasbourg 8030 Mundolsheim d. 26 cm. mouth, common
6b-Freiburg - Munzingen d. 25 cm. rare
6c-Freiburg - Burkheim (d) d. 12.5 cm(?) rare after Kimmig 1947
6d-Freiburg -Wolfenweiler h. 13 cm. rare after Maier 1958
6e-Strasbourg 16293 Höhnheim d. 32.5 cm. infrequent
7-Strasbourg 33453 Aschenheim d. 21 cm. common
8a-Strasbourg 8094 Mundolsheim d. 34 cm. rare
8b-Strasbourg 33492 Lingolsheim d. 16.5 cm. infrequent (d) after dwg. in catalogue

Figure 50 -(Alsace-South Baden group continued)
9a-Strasbourg 47.244 Strasbourg-Gare h. 14 cm. common
9b-Strasbourg 33559 Lingolsheim h. 18 cm. common
9c-Strasbourg 16345 Aschenheim h. 16 cm. rare (d) after Forrer 1922 and dwg. in catalogue
10a-Strasbourg 41284 Cronenbourg h. 28 cm. common
10b-Freiburg 54135 Munzingen h. 21 cm. common after Maier 1958
11-Strasbourg 41280 Cronenbourg h. 29 cm. common
12-Freiburg 39:21b Kleinkems h. 13.5 cm. common
13-Strasbourg 28809 Aschenheim d. 23 cm. common
14-Strasbourg 41285 Cronenbourg h. 30 cm. common
15-Strasbourg 8089/a25 Mundolsheim d. 36 cm. rare
16a-Strasbourg 8071 Mundolsheim h. 28 cm. common
16b-Freiburg P39/60a Munzingen h. 23 cm. common
16c-Strasbourg 8028/A9 Mundolsheim h. 49 cm. rare (d) after dwg. in catalogue
16d-Strasbourg 17,556 Mundolsheim d. 20 cm. common
16e-Strasbourg 16284 Höhnheim d. 20 cm. common

Figure 51 - (Alsace-South Baden Group continued)
17a-Strasbourg - Schlitigheim cast 35197 d. 25 cm. common
17b-Freiburg-Munzingen h. 19 cm. common
18-Freiburg P 39/60d Munzingen h. 16 cm. common
19-Strasbourg 8106 Mundolsheim d. 9.6 cm. common
20a-Strasbourg 8047/a 13 Mundolsheim length 15 cm. common
20b & c-Strasbourg-Aschenheim (d) after Arnal & Burnez 1957, fig. 27
21-Strasbourg 33566 Lingolsheim h. 16 cm. rare
22-Strasbourg - Aschenheim d. 30 cm. (d) after Schaeffer 1925 rare
23a-Strasbourg 8598 Mundolsheim (d) after Forrer 1922 rare
23b-Freiburg - Bischoffshingen d. 15 cm. rare
23c-Strasbourg 33561 Lingolsheim d. 15 cm. rare
24a-Strasbourg 16364 Aschenheim h. 10 cm. rare
24b-Strasbourg-Aschenheim (d) after Arnal & Burnez 1957, fig. 27, no. 10, p. 69 no scale
25-Strasbourg-Mundolsheim (d) after Arnal & Burnez 1957, fig. 27 h. 14 cm(?)

Figure 52 - The Pfyn Culture
Pfyn-Pfyn Schulhaus Museum
Frauenfeld-Stadt Museum, Frauenfeld
Zurich-Schwiezerische Landesmuseum, Zurich
1a-Pfyn 10631 h. 18 cm. common
1b-Pfyn 10202 h. 27.5 cm. common
2a-Pfyn no number h. 7.5 cm. infrequent
2b-Pfyn no number h. 5 cm. infrequent
3-Pfyn 10237 h. 6 cm. rare
4a-Zurich 473 Robenhausen h. 11.5 cm. rare (?)
4b-Frauenfeld 49 Niederwil H. 16.5 cm. (to South Rhine group?)
5-Zurich 351 Niederwil h. 13.2 cm. (to South Rhine group?)
6-Zurich 476 Robenhausen h. 12 cm. common
7-Pfyn 10376 h. 10.5 cm. rare
8-Pfyn 10118 h. 38.5 cm. common
9-Pfyn no number h. 33 cm. common

Figure 53 -(The Pfyn Culture continued)
10-Zurich 1401 Wollishofen h. 29.5 cm. common
11-Pfyn 10344 h. 22 cm. common
12a-Pfyn 10433 h. 8.5 cm. common
12b-Pfyn 10535 h. 12 cm. common
12c-Pfyn 10234 h. 13.5 cm. common
12d-Pfyn 10605 h. 20 cm. infrequent
13a-Zurich 503 Robenhausen common
13 b-Pfyn 10204 h. 18 cm. common
13c-Pfyn 10505 h. 14 cm. common
14- Pfyn 10201 h. 11 cm. rare
15a-Pfyn no number h. 30 cm. common
15b-Pfyn 10324 h. 48.5 cm. rare (?)

Figure 54 - The South Rhine-Bodensee Group
Konstanz-Rosegarten Museum, Konstanz
Schaffhausen-Museum zu Allerheiligen, Schaffhausen
Karlsrühe-Badisches Landesmuseum, Karlsrühe
RGZM-Römisch-Germanische Zentral Museum zu Mainz
Frauenfeld-Stadt Museum, Frauenfeld
Köln-Prähistorisches Museum, Koln (depot)
(note-all Schaffhausen are Thayngen-Weier)

Figure 54 - (The South Rhine-Bodensee Group continued)
1-Schaffhausen 1887 h. 6.5 cm. infrequent
2-Schaffhausen 2606 h. 6 cm. rare
3-Konstanz-Litzelstetten I, h. 12.5 cm. rare
4-RGZM 0,1584 Bodman h. 6.5 cm. infrequent
5a-Schaffhausen 7937 h. 8 cm. infrequent
5b-Schaffhausen 7953 h. 8.5 cm. common
6-Schaffhausen 2631 h. 9.5 cm. infrequent
7-Schaffhausen 2185 h. 9.5 cm. infrequent
8-Konstanz-Bodman h. 11.5 cm. rare
9-Schaffhausen 1446 h. 11.5 cm. infrequent
10-Schaffhausen 2882 h. 8 cm. infrequent
11-RGZM 0,35534 Uberlingen h. 12 cm. rare
12-Konstanz - Bodman d. 28 cm. rare
13-Konstanz - Litzelstetten d. 26 cm. rare
14a-Konstanz - Bodman h. 6.5 cm. rare
14b-Schaffhausen 2899 h. 7 cm. common
14c-Schaffhausen 1871 h. 10 cm. infrequent
14d-Schaffhausen no number h. 11 cm. rare
14e-Schaffhausen 2607 h. 9.5 cm. common
14f-Frauenfeld 8451 Eschenz-Insel Werd h. 9.5 cm. Infrequent
14g-Schaffhausen 1872 h. 5.5 cm. rare
15a-Schaffhausen 2663 length 16 cm. infrequent
15b-Schaffhausen 2605 length 18 cm. common
15c-Schaffhausen 2597 length 8 cm. infrequent
15d-Konstanz - Bodman h. 4.5 cm. rare

Figure 55 -(The South Rhine-Bodensee Group continued)
16-Frauenfeld no number Eschenz-Insel Werd h. 28 cm. rare
17-Schaffhausen no number d. 64 cm. rare
18-Frauenfeld 3685 Eschenz-Insel Werd h. 36 cm. rare
19a-Schaffhausen 1454 h. 33.5 cm. infrequent
19b-Frauenfeld 3692 Eschenz-Insel Werd h. 29 cm. rare
20a-Schaffhausen 2175 h. 28.5 cm. common
20b-Schaffhausen 7947 h. 26 cm. common
21-Schaffhausen 7904 h. 27 cm. infrequent
22-Schaffhausen 2922 h. 30 cm. rare
23-Schaffhausen 7945 h. 23.5 cm. infrequent
24a-Schaffhausen 7930 h. 36 cm. rare
24b-Schaffhausen 1953 h. 38 cm. common
24c-Schaffhausen 2171 h. 48 cm. rare
24d-Schaffhausen no number h. 47 cm. common
24e-Schaffhausen 7909 h. 45 cm. common
24f-Schaffhausen 1453 h. 39 cm. rare
24g-Schaffhausen 2668 d. 46 cm. rare

Figure 56 -(The South Rhine-Bodensee Group continued)
25-Schaffhausen 2612 h. 24.5 cm. infrequent
26a-Schaffhausen 2642 d. 24 cm. rare
26b-Schaffhausen 7955 h. 12 cm. common
27-Konstanz-Sipplingen d. 15 cm. rare
28-Konstanz - Bodman d. 20 cm. rare
29a-Konstanz - Sipplingen h. 13 cm. rare
29b-Schaffhausen 2923 h. 32 cm. common
29c-Schaffhausen 2910 h. 10.5 cm. common
29d-Schaffhausen 2177 d. 23 cm. common
29e-Schaffhausen 7898 d. 30.5 cm. common
29f-Schaffhausen 7940 h. 13 cm. common
29g-Schaffhausen 2202 d. 37 cm. rare
29h-Schaffhausen 7942 h. 10 cm. infrequent
29i-Schaffhausen 2882 d. 16 cm. infrequent
30-Konstanz- Sipplingen h. 10 cm. common
31-Köln - Bodman (after RGZM cast 21737) d. 30 cm. rare

Figure 56 - (The South Rhine-Bodensee Group) cont'd
32a-Karlsruhe C7770 Sipplingen h. 16.5 cm. common
32b-Konstanz-Bodman h. 22.5 cm. infrequent
33-Schaffhausen 2617 h. 14.5 cm. rare
34a-Schaffhausen 7967 h. 37.5 cm. common
34b-Schaffhausen 7907 h. 37.5 cm. common
34c-Schaffhausen 7949 h. 34 cm. infrequent
35a-Schaffhausen no number h. 17.5 cm. infrequent
35b-Konstanz - Bodman h. 19 cm. infrequent
36-Schaffhausen 2180 h. 23 cm. infrequent
37-Konstanz- Sipplingen h. 9.5 cm. common
43-Schaffhausen 7969 d. 23 cm. common

Figure 57 - (The South Rhine-Bodensee Group continued)
38a-Schaffhausen 2176 h. 26 cm. common
38b-Schaffhausen 7891 h. 15 cm. common
38c-RGZM 0, 1581 Bodman h. 19.5 cm. rare
38d-Schaffhausen 1443 h. 23 cm. infrequent
38e-Schaffhausen 2881 h. 14.5 cm. infrequent
39a-Schaffhausen 1892 h. 18 cm. common
39b-Schaffhausen no number h. 13.5 cm. common
39c-Frauenfeld 8449 Eschenz h. 12 cm. infrequent
39d-Schaffhausen 7924 h. 15 cm. infrequent
39e-Schaffhausen 7959 h. 14 cm. rare
39f-Konstanz - Sipplingen (RGZM cast 37942) h. 13 cm. rare
40-Frauenfeld 8452 Eschenz-Insel Werd h. 15.5 cm. rare
41-Schaffhausen 7960 h. 16.5 cm. rare
42a-Schaffhausen 2914 h. 26 cm. common
42b-Konstanz-Litzelstetten I, h. 15 cm. rare
42c-Schaffhausen 7716 h.16 cm. common
42d-Schaffhausen 2888 h. 20 cm. infrequent
42e-Schaffhausen 2624 h. 29 cm. common
42f-RGZM 0,30025 Bodman h. 19.5 cm. infrequent
42g-Karlsruhe C7765 Sipplingen h. 16.5 cm. rare
43-See figure 56

Figure 58 - The Bohemian Group
1-Prague National Museum 27993 Prague-Troja h. 24 cm. common
2-Prague NM 27996 Prague-Troja h. 14 cm. common
3-Prague University Coll. 137 Uřetice h. 9.5 cm. rare
4-Litoměřice Museum - Usti/Elbe h. 7.2 cm. common
5-Prague NM 46,175 Prague-Krč d. 24 cm. rare
6-Prague NM 27997 Prague-Troja d. 34 cm. Infrequent
7-Prague City Museum M 1027 Prague-Bubeneč h. 20.5 cm. rare
8-Prague NM (lost) neg. no. 883,201 Libiš ok. Neratovice
h. 13. 5 cm. rare (?)

Figure 59 - Top - Michelsberg in Schussenried Sites
1-Ulm-Ehrenstein h. 16 cm. common
2-Ulm-Ehrenstein length 12.5 cm. common
3-Ulm-Ehrenstein no scale, after Paret 1955 (piece missing)
Bottom - Unornamented Schussenried Pottery
4-7 After von Troltsch 1902 - Schussenried (Steinhauser Ried)
8-Stuttgart A3236/301 Schussenried d 24 cm. rare
9-Ulm-Ehrenstein d. 23 cm. common
10-Ulm-Ehrenstein 3BI2 h. 16 cm. common
11-Ulm Ehrenstein 6aI3 d. 20.5 cm. common (?)
12-Ulm-Ehrenstein 3B12 h. 30 cm. common
13-Stuttgart A1028f Steinhauser Ried (Schussenried) h. 21 cm.
common (?)
14-Stuttgart - Vaihingen h. 20.5 cm. (d) after FS 20
1912, pl I.

Figure 59 -(Bottom-Unornamented Schussenried Pottery) cont'd.
15-Ulm-Ehrenstein h. 49.5 cm. common
16-Stuttgart-Schussenried h. 26.5 cm. (d) after Gössler 1909
17-Stuttgart-Steinhauser Ried (Schussenried) (d) after Ebert Reallex. pl. 114 h. approx. 9 cm.
18-Stuttgart-Steinhauser Ried (d) after Ebert pl. 114 d. 13.5 cm.
19-Stuttgart-Steinhauser Ried (d) after Ebert pl. 114 h. 19 cm.
20-Stuttgart-Steinhauser Ried (d) after Ebert pl. 114 h. 25.5 cm.

Figure 60 - Ornamented Schussenried Pottery.
1-Konstanz - Sipplingen, also part sherds from Tubingen NE 338, RGZM composite cast 37940 h. 24 cm.
2-Ulm-Ehrenstein h. 19 cm.
3-Stuttgart A1059 Steinhauser Ried h. 13 cm.
4-Stuttgart-Steinhauser Ried (d) after FS 20 1912, pl. I h. 13 cm.
5-Ulm-Ehrenstein h. 9 cm.
6-Stuttgart-Schussenried (d) after FS 20 1912, pl. I h. 9 cm.
7-Stuttgart A3247 Harteneck h. 21.5 cm.
8-Stuttgart-Schussenried (d) after FS 20 1912, pl. I h. 9 cm.
9-RGZM-Schussenried (d) after Lindenschmit 1900, pl. 39, no. 602.
10-RGZM-Schussenried (d) after Lindenschmit 1900, pl. 39 no. 601
11-Konstanz-Bodman Schachen h. 18 cm.
12-Stuttgart A1029a Steinhauser Ried h. 11 cm.
13- Stuttgart A1029b Steinhauser Ried h. 9.1 cm.

Figure 61 - Bohemian Jordanów Pottery
1-Krasny Dvůr 414 Valov h. 9 cm.
2-Prague City Museum-Prague Bubeneč after Novotny 1950
3a-Krasny Dvůr 415 Valov d. 18 cm.
3b-Prague National Museum-Prague Liben 16.5 cm. d.
3c-Prague City Museum-Divice d. 70 cm. after Pokorna 1952
4a-Prague National Museum - Dablice, after Novotny 1950
4b-Krasny Dvůr 412 Valov h. 13 cm.
4c-Prague National Museum - Dablice h. 15.6 cm.
4d-Prague National Museum - Blatov, after Novotny 1950
5-Prague National Museum-Lobkovice h. 12 cm., after Stocky 1929, pl. 58, no. 6
6-Prague National Museum-Nebovidy h. 55 cm., after Stocky 1929, pl. 59, no. 12
7-Prague National Museum-Brozani ok. Ohři h. 11 cm.
8-Prague National Museum-Kobylisy h. 7 cm.
9a-Krasny Dvůr 410 Valov h. 19 cm.
9b-Prague National Museum-Prague Liben h. 9.5 cm.
9c-Krasny Dvůr 429 Chutěbudice 8.5 cm h.
9d-Zatec 572 Most (Komořany ?) h. 8.5 cm.

Figure 62 - Comparative Chassey Forms, after Piggott 1953/4, Bailloud 1952/55, Arnal & Burnez 1957, Piggott(unpublished)

Figure 63 - Comparative Moravian TRB, Altheim, Baalberg, Rossen Forms
1-Brno Museum-Jevisovice C2 h. 30 cm.
2-Brno Museum-Jevisovice C2 h. 14.5 cm.
3-Brno Museum-Jevisovice C2 h. 12.5 cm.

Figure 63 -(Comparative Moravian TRB, Altheim, Baalberg Rössen Forms) cont'd.
4-Stuttgart 27040/296 Goldberg III h. 43 cm.
5-Stuttgart G 28002 Goldberg III h. 42 cm.
6-Store Valby after Becker 1954
7-9 After Grimm 1937
10-Strasbourg 17442 Mundolsheim d. 24.5 cm.
11-Strasbourg 17257 Holzheim d. 33.5 cm.
12-Worms 407 Monsheim II h. 40 cm.
13-Neuwied 2880 Gladbach h. 90 cm.
14-Worms no number Monsheim II h. 85 cm.

Figure 64 - The Comparative Frequency, Duration and Distribution of Common Types.
1-Karlsruhe C 7383 Michelsberg h. 16.5 cm.
2-Karlsruhe C 8294 Michelsberg h. 21.5 cm.
3-Bonn 20301a Mayen h. 9 cm.
4-MRAH Brussels-Spiennes h. 15 cm.
5-Baking Plate, generalized
6-Schaffhausen 2624 Weier Thayngen h. 29 cm.
7-Strasbourg 33453 Aschenheim d. 21 cm.
8-Stuttgart G28010/97 Goldberg d. 31 cm.
9-Karlsruhe C 5967 Michelsberg h. 14 cm.
10-Wiesbaden 13,229 Adolfshöhe h. 14.5 cm.
11-Darmstadt A 1948:173 Buttelborn d. 24 cm. at mouth
12-Stuttgart 29045/354 Goldberg h. 35 cm.
13-Stuttgart 29016/401 Goldberg h. 46 cm.
14-Schaffhausen 7967 Weier-Thayngen h. 37.5 cm.
15-Mayen 763 Mayen h. 22 cm.
16-Speyer-Iggleheim h. 23 cm.
17-Mayen 763a Mayen d. 24 cm.
18-Karlsruhe C 7378 Michelsberg h. 23.5 cm.
19-Stuttgart 29050 Goldberg d. 23 cm. at mouth
20-Strasbourg 41284 Cronenbourg h. 28 cm.

Figure 65 - Relative and C 14 Chronology.

Figure 66 - The Maps of Becker and Vogt Compared.

Plates

CHAPTER I

THE SETTING - GEOLOGY AND GEOGRAPHY OF THE HAINE VALLEY

1) The Natural Regions of Belgium

The frontiers of modern Belgium are not based upon natural boundaries. The rich, fertile area of the North Sea maritime plain with its green polders stretches from the cliffs of Calais (at Sangatte) almost to the coast of Denmark, and the Belgian portion occupies little more than 50 kilometers of this long strip. The maritime plain of the Belgian coast is protected by lines of dunes and dykes from the waters of the Flemish sea which at high tide would otherwise overrun it. These tides, which have a maximum amplitude of 5 meters, define in a sense the extent of the maritime plain which is considered to lie from the band of dunes up to the 5 meter altitude contour. It is a region roughly 12 to 15 kilometers wide, running more or less east to west.

South of the maritime plain, the land rises gently in long, undulating sandy ridges, attaining a maximum height of not over 20 meters. This part of the country is known as lower Belgium, and its southern limit extends on a line roughly drawn between Ghent and Louvain. It is a region of predominantly sandy soil with small neat farms, and a density of population approaching the highest in Europe. In lower Belgium, it is difficult to find a spot where one can see fewer than five villages from the church tower of any other.

Middle Belgium begins rather abruptly with a definite sharpening of surface relief, especially east of

Brussels. Fairly steep ridges with dry valleys oriented for the most part in a northeast--north direction and covered with a heavy, fertile, sandy loessic soil characterize the terrain. Its southern limit is conventionally marked by the line of the rivers Sambre and Meuse which, from the French to the Dutch frontier, cut the country transversely. Middle Belgium hence lies roughly between the regions of 20-200 meters in height.

South of the Sambre-Meuse the country rises more rapidly still, the relief becomes mountainous, clear sparkling streams descend rapidly over bare rock from the forest-covered hills of the Ardennes--the whole known as Upper Belgium. Further south still, lower Luxemburg begins, geographically a part of the Paris basin and somewhat lower in altitude than the surrounding mountains.

These natural regions of Belgium correspond approximately to the distribution of the main geological formations.[1] The maritime plain is an area of modern marine deposits, most of which were laid down within historic times. Lower Belgium is primarily the region of the great development of Pleistocene and Tertiary sediments, while Middle Belgium, though not without extensive Tertiary cover, is primarily underlain by the great Cretaceous belt which continues under the whole of Normandy, Picardy and the Artois. The erosive action of the Sambre-Meuse system has exposed the primary rock on its southern edge, as have some parts of the upper Escaut system. Upper

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[1] Leriche 1913. Stevens 1938.

Belgium corresponds for the most part to outcrops of the lower Devonian sandstone and Cambrian rocks (Paleozoic). Lower Luxemburg rests upon the Triassic and Jurassic (lower Secondary) system of the Paris Basin.

2) The River Systems of Belgium

The river systems of Belgium belong to two drainage basins, one ultimately reaching the sea through the Meuse and the other through the Escaut (Scheldt). The orientation of this river system is in itself rather peculiar. Only one small river, the Yser, penetrates the dunes and flows directly into the sea. The other great systems flow almost parallel to the modern coast. In both systems the southern tributaries are quite well developed, while the northern ones are almost non-existent. Hence, both river systems are strongly assymetrical. The tributaries of the systems, however, flow for the most part towards the coast and build up the Escaut and the Meuse.

The system of northwardly-flowing rivers is a system consequent upon the regression of the sea in a north-northeast direction in Pleistocene times. The consequent system is cut by the Haine-Sambre-Meuse which effected a series of captures of the older system subsequent to the initial erosion. They have been likened to a transverse gutter catching the waters flowing from a peaked sloping roof--the line of the peak represented by the Ardennes of upper Belgium. In Middle Belgium, unequal resistance to erosion of the underlying rock has resulted in a number of later diversions, giving rise to a number of other subsequent rivers.

According to the theory of Cornet[1], the hydrographic system of all but the upper Ardennes and Lower Luxemburg was born with the regression of the sea at the end of the lower Pliocene period (Diestien), and the seas of the upper Pliocene (Scaldisien) covered only a very small region in the northern part of the country. Tavernier[2] has assigned the formation of the river system to a somewhat later period in the middle Pleistocene. During the Pleistocene, Cornet thought that the fold running transversely across the country, represented by the Haine-Sambre-Meuse valleys, was accentuated, and that this accentuation gave rise to the Haine-Sambre-Meuse system. Previously, the principal rivers flowed north-northeastward, but they were decapitated by the formation of the transverse system. The form of the theory as outlined in 1904 has undergone substantially little modification to the present day, with the exception of the deduction of a second consequent system in Lower and Middle Belgium around the Yser, resulting from the Flandrian regression.

3) The Geography of the Haine Valley

Travelling southwest on the main road from Brussels to Paris, we traverse the rolling hills of Middle Belgium with their dense concentration of farms and the many small towns of Walloon Brabant. Soon the country rises, and a high plateau with very large fields and farms is reached south of Soignies. We pass south of Casteau; abruptly, the plateau falls away, and we see stretching before us for some tens of kilometers a wide valley, which

[1] Cornet 1904.

[2] Tavernier 1954.

looks as though it might contain a river of a very great size. Instead, at the base of the hill which descends from Casteau towards Nimy, looking in the direction of the Belfry of Mons, there is only a small stream running almost due east-west. This is the Haine, from which the province of Hainaut takes its name[1]. Before us stretches a line of gently rolling hills, now running roughly east-west instead of the predominant north-south direction which is so characteristic of the Brabant ridges. This is followed by still another line of hills, and yet another, stretching upwards towards the primary plateau of Mabeuge and the French frontier on the horizon.

From the tower of the Belfry of Mons, looking south, we see that off to our right a broad alluvial plain dotted with the tip heaps of innumerable coal mines stretches out in flat, uninteresting grayness towards Valenciennes. From almost under our feet, the Mons-Condé canal streaks in a dead straight line across this ugly region into the hazy distance, carrying some of the water which once flowed in the bed of the gently meandering Haine as it wandered through kilometer after kilometer of marsh on its way to the Escaut at Condé. Somewhat to the south, the tip heaps become even more frequent, and the small, brick, two-storied houses seem to form a nearly continuous mosaic on the sloping ground. This is the mining country--the Borinage made famous by the somber paintings of Van Gogh--once the heart of industrial Belgium, now economically in its death throes as mines are abandoned.

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1 The vast valley is shaped not by the river, but by the deep synclinal structure which underlies it. (Stevens 1944, 1947, 1951. de Magnée 1948.

Almost due south, however, the countryside again emerges from beneath the blight of the Black country and the rolling hills are dotted with picturesque small villages, many unchanged in character since the 18th century. The hills are cut by rapidly-flowing streams, all bearing towards Mons, some cutting steep-sided ravines as they rush to join the Haine. Large seigneurial farms with typical spired gate towers attest to the richness of the land. Directly in front of us lies a small hill, Mount Eribus, due south of the city and almost dwarfed by the tip heaps of Cuesmes. To the east, another hill rises nearby, shaped somewhat like the back of a Bactrian camel: the double humps of Mt. Panisel and the Bois de Mons. To the southeast of this hill, blocked from our view, stretches a vast, dry, northwardly-inclined slope, shimmering in the heat of the summer, blown by icy winds in winter, with no water to be seen anywhere. Finally, to our left, meandering through dense woods from the direction of Havré, is the Haine, encased in a narrow valley, running due east and out of our line of vision towards Morlanwelz and the plateau of Anderlues, 20 kilometers distant.

Descend from the Belfry of Mons, leave the town via the roundabout which gives access to the road marked Mabeuge and Paris (250 kilometers) and travel to the frontier, some 12 kilometers distant. Mount one of the nearby sandy hills, perhaps the one due south of Havay which still bears the small hillock constructed for the optical telegraph of Napoleonic times to carry news from the Brussels to the Paris Bourse, and look back on the country we have covered. In the far distance the plateau of Casteau rises abruptly in an arc behind Mons, whose

Belfry glints in the denser air of the valley bottom. The Bois de Mons rises to its right, with the next relay post of the old optical telegraph marked by a lone tree near the top of a mound. In front of it, we see a vast ridge circling around Mons from the Borinage on our left and off into the distance toward the Centre on our right. We see that this ridge has been cut by enormous quarries along much of its length, and the radiating whiteness tells us that it is composed of nearly pure chalk. This is the cuesta of Harmignies-Spiennes. A second ridge, less pronounced, lies between us and the Spiennes-Harmignies ridge. This is the cuesta of Vellereille-le-Sec. To our right stretches a line of high sand hills like the one on which we are standing, marking the frontier; to our left as well, a similar line of hills runs off into the distance, the whole following more or less the course of the small but very straight road which passes beneath our feet. This road to our left marks the frontier. A dirt track in the direction of Goegnies Chaussée, it runs as far as the eye can see in a straight line towards Binche or, more precisely, towards the hill of Waudrez faintly visible in the distance. The road turns, then resumes its original direction and continues on through the remainder of Hainaut, crosses the province of Namur and goes on and over the Dutch frontier to Maastricht. In many places, only the boundaries of the fields mark its former passage. This is the Roman road from Bavai to Cologne.

The ensemble--the alluvial plain west of Mons, the Borinage with its black, man-made mountains, the high

cuestas of chalk, the upper dry plateau stretching off toward Binche, the sand hills on the frontier, the forests on the northern and southern slopes--this is the valley of the Haine and the setting of our study.

4) The Hydrographic System of the Haine Valley

The Haine is a subsequent, superimposed river. It has its source on the Plateau of Anderlues in the Eocene Bruxellian; then it penetrates rapidly to the base of the Eocene, flowing on the Yprésian and Landenian, reaching the Cretaceous shortly thereafter, and flowing on the schists of the Westphalian, finally remounting the Cretaceous and the various Tertiary layers in turn toward the bottom of t he valley.

The Haine flows northwards from the Plateau of Anderlues for about 6 kilometers and is joined by the Haie, which has been running parallel to it for a little more than that distance. At Morlanwelz-Carnières, the combined stream swings suddenly to the west and is joined by several small brooks. This is the first section of the Haine. Stevens[1] attributes the rapid deepening of the upper valleys to tectonic elevation of the Anderlues plateau with consequent renewing of erosion and accentuation of relief. We think that this deepening might well be simply the river cutting its upper valley by erosion after depression of the lower reaches (base level) of the river. This depression is much more easily demonstrated than any rise in the Anderlues plateau[2]. The turn at Morlanwelz has been attributed by Stevens to a capture caused by

[1] Stevens 1951.

[2] Jones 1950, map; Jones 1948.

tectonic change. It can also be thought of as resulting from the fact that at this point the primary rock (Westphalian Schist) comes very close to the surface, and the river is forced to detour around it, taking a path of lesser resistance toward the chalks to the west. Actually a capture of a northward-flowing river, represented by the Haie-Haine, is possible too.

From Morlanwelz to Mons the river valley gradually loses its steep sides, but it remains relatively narrow, flowing successively on the Senonian St. Vaast chalk, the Turonian Maisières chalk, the flint of St. Denis and on Turonian gray-blue marls with siliceous concretions--Fort Toises in the Walloon miner's patois. This sequence represents an almost uniform decrease in erosional resistance. Between Morlanwelz and Mons, the river receives four minor tributaries from the north (the Ruisseau de St. Pierre, the Wanze, the Ohroecheuil, the Thireau) and two major ones from the south (the Ruisseau d'Estinnes and the Samme, the latter in itself having several tributaries).

Immediately to the west of Nimy, the Haine widens out suddenly and from a very narrow channel expands into a marshy plain one kilometer wide just north of the city, becoming three kilometers wide a bit to the west where it is joined by one of its important tributaries, the Trouille. This third section of the Haine, 21 kilometers long from Mons to Condé, sees the alluvial valley eventually reach over six kilometers in width on the other side of the French frontier. The drop in altitude is very slight indeed, being only about ten meters over

the entire distance. Many places along the lower reaches are actually lower than the bed of the river, are permanently inundated and are drained by a system of polders. Apart from four or five minor tributaries flowing from the north, the river receives about nine flowing from the south, of which the Hogneau-Honnelle is the most important. It joins the Haine on the French side of the frontier. The river is actually canalized along much of its length, or is paralleled by canals. Today, as Cornet puts it, "it serves as one vast sewer for the surrounding region"[1].

Three of the southern tributaries of the Haine--the Samme, the Trouille and the Honnelle--have fairly complicated basins in themselves but, in general, they flow more or less north-south and are thought by Cornet[2] to follow the course of the normal consequent river system joining up with the Dendre-Senne system of Middle Belgium, decapitated during the Pleistocene by the formation of the Haine. The proof offered for this is the presence in the river beds on the northern slopes of the valley of lower Devonian pebbles from the outcrop on the southern sides. More conclusively, flints from the Cretaceous layers of the Haine valley are found in the beds of the northward-flowing rivers which are tributaries of the Dendre-Senne system on the other side of the modern water divide, though these tributaries in no part of their courses flow on the Cretaceous. Stevens[3] has offered extensive explanations for the capture of the Trouille at

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[1] Cornet 1927.

[2] Cornet 1904.

[3] Stevens 1936.

Mons and, in other works[1], offered explanations for the captures at other points, largely tectonic in nature. The southern Haine tributaries should, in our opinion, actually be classed as antecedent rivers because they follow the direction of erosion originally established after the initial Pleistocene erosion, cutting through the cuestas south of Mons in an almost typical trellis drainage pattern, with subsequent branches following along lines of least resistance parallel to the cuestas.

The Haine flows 48 kilometers from its source at Anderlues to its junction with the Escaut at Condé. Over this distance it drops from 180 to 20 meters in altitude; if the tributary Haie is taken as a source, the drop is from 190 meters. Between Mons and Condé, the slope is less than 0.35 mm. per meter and the stream is quite slow and sluggish. The normal low water flow at Thulin is 2.4m^3 per second, and, in dry periods, has been known to descend to less than a cubic meter per second. During some of the worst floods, the volume of water has reached 50 m^3 per second.[2] If the catchment area of the Haine is taken to be roughly 800 square kilometers and the average rainfall in the area of the order of one meter per year, then the total run-off is only about 10.5% of the total rainfall. We have excluded the catchment area of the Hogneau-Honnelle and its tributaries from this calculation because the flow rate at Thulin does not include the run-off from this area. This is a somewhat low percentage run-off from an area which includes a large inhabited region, though the evaporation in the

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[1] Stevens 1938, 1951.

[2] Data from Cornet 1927.

extensive area of pine forest along the northern slope of the valley and on the heavily cultivated arable land in the southwest may partially account for it. Additional losses through subterranean run-off must be considerable[1]. Stevens tells us[2] that more than 10^7 cubic meters a year are extracted from beneath the chalk at one point alone between Pommeroeul and Bernissart as a water supply for parts of Flanders. This amount alone represents about 1.2% of the total rainfall, and it is taken from a very limited area.

Calculations concerning the water run-off under various climatic conditions, a-forestation, etc. are subject to many variables, some of which are poorly understood; but they, to our knowledge, have never been introduced into the question of the erosional effects of the Haine and its tributaries on the valley. We do not possess adequate statistics to attempt this. If we assume that the water run-off in conditions of mixed oak forest approached a much higher percentage of the fall, we can see that, prior to Neolithic deforestation and presuming average rainfall somewhat higher than today, the Haine was a considerably more active river. In periods of dryness, the run-off was undoubtedly less. Hence the volume of water carried by the Haine and its tributaries is likely at one time to have been sufficient to produce considerable erosional effects in the valley with consequent effect on the relief, and we cannot attribute all of the surface features to tectonic influences as Stevens has done.

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1 Foster 1948, p. 420; Marlière 1934.

2 Stevens 1951.

5) The Formation of the Haine Valley

We shall trace the formation of the Haine valley on a morphological basis for it is important in determining the effects of Pleistocene climatic fluctuations and hence our Paleolithic chronology.

Sheet wash on the uneven slopes of the now destroyed early Pleistocene deposits was directed more and more into broad channels (rills). Gradually, some of these rills came to grow deeper than others through more favorable positions with respect to easily-eroded layers, or because of pre-existing topography, and the consequent river system of Middle Belgium flowing north-northeast towards the coastline of that time was formed. As the erosion continued, the Escaut worked its way upstream, deepening its valley. Areas not easily reached by the stream system remained relatively untouched, producing the isolated hills of Flanders and Mt. Panisel. The extent and degree of the post-Diestien erosion can be judged from the fact that the height of these hills is seldom less than 100 meters above the surrounding countryside when the Diestien cap is preserved, or somewhat less (as in the case of Mt. Panisel) when erosion has removed even that.

The valley of the Haine was deepened either through earth movement or dissolution of Cretaceous layers beneath it, and it gave the axial direction for a subsequent tributary of the early Escaut. As the nascent Haine worked its way eastwards, carving out its valley in the pre-existing syncline, it decapitated some of the northward-flowing tributaries of the Dendre-Senne system which were

the ancestors of the Trouille, the Samme and some of the other southern tributaries. These rivers then became tributaries of the Haine, which continued to erode its way east toward the Anderlues plateau. The system which formerly had been tributary to the Samme, Trouille and other systems deepened and became part of the trellis drainage pattern which parallels the outcropping of less easily-eroded layers of the east-west syncline. Rills formed on the northern slope of the syncline and were eventually consolidated in the small group of northern tributaries flowing at nearly right angles into the Haine.

Further depression of the bottom of the Haine valley--probably in several places near Crespin, Mons and Maurage and probably attributable to dissolution of underlying chalk--lowered the base level for the southern tributary streams and caused them to deepen their beds quite rapidly while, at the same time, their directions were modified slightly so as to flow more nearly in toward the centers of depression. Concurrently, the upper reaches of the southern tributaries were pushed gradually back toward the French frontier and over it where, meeting the resistant outcropping of the primary plateau of Mabeuge, the "sur-elevation of the Haut-Borinage"[1], they developed a radial drainage pattern around it. The southward extension of these tributaries has continued into very recent times, geologically speaking, as Cornet[2] has shown. Meanwhile, subsidence of the lower Haine valley resulted in acceleration of the erosion of the region west of Nimy-Obourg and the deepening of the Haine channel. Ultimately,

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1 Stevens 1938.

2 Cornet 1927.

the capture of the Haie and what is now the source of the Haine on the Anderlues plateau took place. This capture occurred near the resistant outcropping of the Westphalian at Morlanwelz-Carnières, as the head of the Haine shifted slightly south toward less resistant strata.

Subsidence in the Escaut-Haine junction region has been going on continuously for a long time, and, as the base level here was lowered without corresponding lowering of the base level further downstream in the Escaut basin, the entire junction became choked with erosional debris brought down from the upper reaches of the two rivers.[1] The synclinal valley of the Haine was gradually filled up with alluvium and took on its present aspect of a wide alluvial plain, and the Haine wound its way across it. Further subsidence has produced the marshes characteristic of the lower Haine. The northeastward-flowing southern tributaries, as a consequence of subsidence near their junctions with the Haine, cut their way down along their old courses in a system of entrenched meanders. Their small tributaries followed suit, carving out valleys along the lines of least resistance, often leading to subsidiary captures such as that effected upon the upper Trouille north of Givry by the Ruisseau des Coutures which followed a line of weakness between the Devonian south of Haulchin and the chalk cuesta of Vellereille-le-Sec. Numerous recent captures of this nature may have produced the dry valleys running roughly north-south, which are the remains of the decapitated water courses. Even more recent captures have been effected in the southern-

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[1] As shown by Marlière 1939.

most watercourses and equilibrium is far from being reached.

We cannot place this entire sequence of events exactly in time, for we do not know the number or continuity of episodes of subsidence in the center of the valley which controlled the whole process. In any case, it seems clear that this factor played a much greater role in determining events in the formation of the various water courses than did any changes in the base level of the Escaut system produced by eustatic changes in sea level. Hence, terraces and older river courses in the valley cannot be compared with eustatic terraces in river valleys in other more stable systems in northwest Europe. Any attempt to correlate altitudes of hill-wash deposits or gravels with various changes of sea level in Pleistocene times runs into the immediate problem of accounting for changes to be attributed to subsidence with resulting change in base level of the lower Haine and increased erosion in its upper reaches. This in some cases produced pseudo-terraces having nothing to do with a possible eustatic system but indistinguishable from it. As we shall show later on, the Pleistocene deposits in the valley cannot be correlated by altitude with any terrace deposits attributable with certainty to either cause, though they can be analysed by other means. Further, the question of greater or lesser periods of erosion and downcutting or of filling in is also related to variation in rainfall and vegetation; and the complications introduced by attempting to correlate four variables, one of which is

almost unpredictable (subsidence), makes it unlikely that these methods, so seemingly successful elsewhere, will ever be of any use in the Haine valley.

6) The Soils of the Haine Valley

The modern soil of the Haine valley is generally developed on the Pleistocene deposits discussed above, though the underlying rock has played a dominant role in varying its character from place to place. The Service des Cartes des Sols is at present engaged in the plotting of detailed maps on a scale of 1:20,000 of all of the soils of Belgium but, at the moment (1957), only a very few squares in the Haine valley area are complete. None of these have been published as of the date when this paragraph was written, though the research and field work is complete in several typical places. We have examined the findings of the field survey, based on over 12,000 measurements in each 60 kilometer square for the sheet 152 W (Binche) by G. Henrard, which provides a fairly representative section of the soils in the upper Haine valley on the southern slope of the syncline. We await results from the lower alluvial valley and for the northern slope of the syncline, especially in the region of Obourg for, here, the situation is somewhat different from that depicted in the map for Binche (equivalent to sheet 46/5 of the military map).

Henrard[1] notes that the relief is in direct relationship with the hydrographic system and the geological substratum in the upper Haine valley. The high

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1 Henrard 1952.

plateau to the south is based on the Devonian sandstone (Burnotian and Koblenzian), and the center and northern parts of sheet 46/5 have softer substrata, resting on the Senonian, Turonian and Landenian. The course of the Samme and the Ruisseau d'Estinnes varies sharply, as we have already noted, according to the different geological layers which they traverse.

In the southern part of the valley where the loesses repose directly on the primary substratum, the rivers are confined and their course is quite rapid, while it is slow and sinuous on the secondary substratum in the center. On the secondary base is deposited an alluvium which attains its greatest thickness over the chalk of Trivières. The alluvium is less important on the chalks of Obourg and St. Vaast. This comes about, Henrard explains, from the fact that the latter two contain numerous flints and are harder than the Turonian chalk of Trivières; hence they are not as low and easily covered with alluvium. We note that this explanation coincides with Raucq's[1] explanation of the origins of the Vellereille and Harmignies cuestas, both of which terminate on the map sheet studied by Henrard.

A role in soil formation is allotted to quite a number of the geological layers which outcrop on the southern slope of the valley. The recent Haine alluvium in itself forms a soil, as does the hill wash which is ever present in the valleys. The loess which covers most of the surface of the flanks of the valleys and parts of the hill tops is the major base for soil formation. The upper Landenian, in the form of a simple clay or of lignite or white sand (with lignites, silicified wood and sandstone) produces some soils; and the lower Landenian

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[1] Raucq 1929.

with its olivine sands also serves, where exposed, as does the whole Cretaceous group which we have described previously. The Carboniferous limestones and schists, as well as the lower Devonian, have also been weathered into soils where they reach the surface.

The Haine alluvium is in large part disturbed by the present canalization of the river. The alluvium of the Ruisseau d'Estinnes and the Samme forms a hetrogenous sediment--clayey and grayish-blue in color--covered in spots by recent hill wash. Henrard, in conversation with the writer, states that he observed no peat or older alluvium whatever in this area up to the limits of depth sounded (1.25 meter) but the more recent layers may be too thick to have permitted reaching it with an ordinary soil sonde. The marshy areas have not been examined because of mining subsidence. The recent hill wash covering the alluvium is mostly a sandy sediment--red-brown or gray in color--without structure, or with a finely-divided flaky texture, often rust-spotted and gleyified to a variable depth and containing traces of charcoal, bricks and other debris.

The upper younger loess serves as a mother rock for the soils of 70% of the valley. It has a variable thickness of from one to six meters in the region though, in some spots, it is completely eroded away and the lower rock forms the surface. Originally, the loess was a yellow friable silt, wind and snow-deposited, containing from 1 to 15% clay and often calcareous. Consequent upon the development of the post-glacial forest, it was subject to profound modification from both a structural and from a granulometric point of view.

The typical soil profile is formed by an eluviation horizon from 40 to 70 cm. thick of loess diminished in fine particles (clay). It is of grayish yellow color with a diffuse lower limit, containing up to 14% clay. The illuvial horizon below (the so-called "brick earth") is enriched in clay, containing from 18 to 22% of that mineral. It is of red-brown color, polyhedric or prismatic in structure, generally streaky or marbled in appearance with the ocherous color diminishing with depth. The percentage of clay diminishes progressively, but the limit between the enriched horizon and the original loess is quite clear. After deforestation and under the influence of agriculture and erosion, the ochre streaks and marbleizing tended to disappear. Where the loess is thin, it is often somewhat hetrogenous and the influence of the underlying rock is more apparent, especially if it is somewhat less permeable. The water table and traces of rust at slight depth are observed.

Clays and Tertiary sands tend to be concentrated more on the southern rim. Some outcrops lead to heavy clay soils as well as light sandy soils.

Chalks and clays of the secondary period are significant because chalk constitutes the substratum of the whole center and eastern part of the valley. This area of the two cuestas previously discussed produces soils of little thickness belonging to the rendzina group of brown calcareous soils. As we have seen, the river alluviums reach some degree of thickness with this type of substratum.

The lower Devonian gives soils of permeable or impermeable character depending on the degree of weathering

of the mother rock. The Carboniferous schists can give a red prismatic clay which is impermeable, or they can also give a very rocky permeable soil. The sandstones and psammites generally give very sandy permeable soils. These rocks are localised in the southand east of the valley and are covered by layers of loess on which the actual soil is formed for the most part.

It can be seen readily that the variety of soils available in a very small sample of territory is enormous. That fact played no small role in our choice of the region for a study of this kind.

CHAPTER II

THE PLEISTOCENE AS A WHOLE IN BELGIUM AND NORTHERN FRANCE

1) History of the Subject

The knowledge of the Pleistocene deposits, in which are found archaeological specimens of the kind which are our subject, has had a rather tortuous history. Initial interpretations worked out in the 19th century were very schematic indeed and concerned themselves largely with a distinction between the various silts deposited on slopes, in valleys or on plateaus. It was soon recognized that this classification (still visible on the older editions of Belgian and French geological maps) was unsatisfactory, and explanations of the variety of deposits based on other evidence were derived. The studies took three principal directions. Ladrière[1], one of the earliest investigators, based his work upon a classification of the various sediments in northern France and western Belgium, a classification derived from their appearance. This entirely lithological scheme has many failings, because of the varied appearance of deposits of identical age. Variation of facies is extremely pronounced, of course, in non-marine deposits, where local influences from different sub-soils make themselves felt. Ladrière did not deal with the Pleistocene marine deposits at all, and hence had little on which to check his classification over great distances. Moreover, certain deposits are remarkably similar though of completely different age, and this often led him into error. What was later hoped

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1 Ladrière 1890, 1892.

for was clearly an application of the classical methods of geological stratigraphy, based upon fossils characteristic of each layer, to straighten things out. Unfortunately, however, the Pleistocene is a relatively short geological period, and most of the fossils encountered in continental deposits do not undergo enough variation to provide a very fine time scale.

Commont[1] thought to solve the problem by regarding the stone tools of early man as sufficiently varied in character to serve as zone fossils. Furthermore, he tried to take into account the time taken for the major rivers to erode their valleys. This erosion had for some time been recognized as proceeding in a discontinuous fashion. The several glaciations of Pleistocene times were thought to be responsible for this variation in erosion. While much water was locked up in glacial ice, the sea level was lowered, and the rivers could erode their beds to a lower level. During the interglacials, correspondingly high sea levels caused the rivers to tend to deposit their load and build up sediments at their mouths. Consequently, a series of sloping terraces were left on the valley walls marking the different periods of accumulation, and it was assumed that the higher the terrace the older the interglacial phase represented. It was further observed that the deposits of Pleistocene loess (fine, windblown silt) were more and more complex as one mounted higher terraces, and hence that the age of the loesses and other deposits could be correlated with the heights of the terraces. But the confusing variations in facies even on the same

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1 Commont 1913.

terrace required a zone fossil to confirm the correlation, and this was to be found in the flint tool industry contained within the type deposit.

Commont's scheme was ingenious, and it must be admitted that it has had more general acceptance than any other, but it is open to a number of serious objections. It was observed[1] that the flint industries varied enormously themselves even though they belonged to the same general period, this variation taking place not only on a regional basis but even within a region, reflecting different skills, materials and needs. Hence the industries as defined could not be relied upon as zone fossils except in a very broad and general way. Moreover, we may add that Commont did not differentiate the terraces near the mouth of the river from those far upstream. The river regimes in these two zones produce very different reactions to climatic and ocean level changes.

Dubois[2], strongly influenced by the objections to Commont's approach (which was applied in Belgium with still less success by Rutot[3]), decided to approach the problem by considering the neglected marine deposits, reasoning that the proper understanding of these would lead to a series of correlations with the continental deposits. His effort was materially assisted by the then recently worked-out scheme of Déperet for variations in sea level with the various interglacials, and five periods of high sea level (including the present) were utilized in connection with the deposits found along the

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[1] As quoted by Dubois 1924.

[2] Dubois 1924.

[3] Rutot 1919.

coast at various altitudes, in the form of raised beaches. He was willing to take into account the larger archaeological divisions such as Paleolithic, Neolithic, Roman and the like, but rejected any finer distinctions as introducing error. For the continental deposits, he preferred to base himself almost entirely upon the faunal remains except where direct correlation with marine deposits was possible. He thought that the loess was the result of local disintegration of the underlying rock with no disturbance or foreign matter or long-range transport of materials included. Hence, he believed that it was illusory to fix the age of the formation, since it began the moment when the underlying rock was exposed to the air and continued to the present day. He was forced to admit that some loesses do have a stratigraphic value but, in his general rejection of their importance, he reduced the value of his interpretation of the continental deposits. Furthermore, his reliance on changes in absolute sea levels led to absurdities when applied to deposits far from the coast and out of the range of tidal influence, where climatic factors play a much more important role. He further neglected entirely the question of earth movements and their effect on the altitude of deposits.

The much-discussed (by prehistorians) analysis of the Somme valley deposits by Breuil and Koslowski[1] actually introduced no methodological advance over Commont and Dubois and, in some respects, caused confusion. It must be said that Breuil did examine the archaeological

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1 Breuil and Koslowski 1931, 1932, 1934.

finds in detail and this led to more careful consideration of their value as zone fossils.

The German school, notably Soergel and his followers, attempted to deal with the question of Pleistocene stratigraphy on the basis of the interrelation between the loess deposits and the glacial deposits which cover or are covered by them in northeastern Europe.[1] This fruitful approach is somewhat marred by the complexity of the glacial deposits themselves and uncertainty about just what each deposit represents. Until recently, French and German chronology contradicted each other.[2] This approach in North America has been far more successful, and the summary by Flint[3] gives a good idea of what has been achieved. The situation there is simplified by a more favorable direction of river flow (southwards away from the glaciated region, rather than northwards as in Central Europe) and the relationships between the loesses and the glacial debris are much clearer over wide sections of the country. Flint observes that "the broad outlines of north American Pleistocene stratigraphy have been developed without benefit of cultural data (archaeological material), yet with less complexity and disagreement than have appeared in Europe".

More recently, Bordes[4] has revived the system of Commont, giving it new life by a much more thorough examination of the archaeological evidence, and this has led to a very interesting analysis of the material in the

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[1] Summarized in Zeuner 1946 and partly in 1952, and by Charlesworth 1957.

[2] Bordes 1954, 1956.

[3] Flint 1949.

[4] Bordes 1954.

Seine valley. The reader is referred to the bibliography and discussion in Bordes' principal work.[1]

2) The Pleistocene in Belgium

In Lower and Middle Belgium, the lower Pleistocene is characterized by formations which seem to show no direct connection with the river system as it is known today. In northern Belgium, the first stage is represented by sedimentary marine deposits. The period is represented by the Amstelian deposits which are equated with the Calabrian deposits (thought to be earliest Pleistocene) on the basis of micro-paleontological specimens. Tavernier[2] inclines to attribute the base of the Pleistocene to the Poederlien (lower Amstelian) which he equates with the British Red Crag Waltonian and the Limonitsandstein in Germany. In general, Tavernier proceeds as did Dubois, basing his argument on the marine deposits and ignoring the archaeological evidence. Tavernier does not fall into the errors of Dubois with regard to an omnipotent eustatism (reliance on variations in absolute sea levels); nor does he ignore the question of earth movement and tectonic change.

In north Belgium, the last deposits of the lower Pleistocene are the Mol sands, often attaining 200 meters in thickness. A horizon of air-blown, polished quartz gravel in these sands is taken as evidence for the first glaciation. In the province of Liège and the Meuse-Ardennes regions, sands with lumps of white quartz containing little pebbles which look like fish eggs (ooliths) are considered by Macar as contemporary with the Mol

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[1] Ibid.

[2] Tavernier 1954.

polished pebble horizon and hence Gunzian.

Tavernier believes that earth movements which took place all over the world during the Pleistocene period provoked renewals of erosion permitting the water courses to attack fresh material. This explains the contrast between the composition of the gravels of transition between the Pliocene and Pleistocene and those of the Pleistocene deposits properly speaking.

On top of the Mol sands come formations characterized by clays and fine sands known as the Clays of the Campine, which Tavernier believes to be a fluviatile alluvium deposited in the vast plains of a meandering river system which flowed roughly east-west. The marine deposits known as Icenian are found as a stratigraphical continuation of these clays along the Dutch frontier, and the flora and fauna indicate a temperate climate. The clays are hence associated with the Gunz-Mindel or First Interglacial.

The middle Pleistocene is characterized by Tavernier as coinciding with the formation of the high and middle terraces of the Meuse valley by a hydrographic system resembling that of the present day. This development would correspond to the Mindel glaciation, the Mindel-Riss interglacial and, hypothetically, the Riss glaciation as well. The establishment of the river system direction is attributed to tectonic change--uplift, sidewise slip and see-saw movement. Petrological horizons for the period are the Tegelen clays which are equated with the Campine clays and hence Gunz-Mindel Interglacial and the Neede horizon with the Mindel-Riss Interglacial.

Apart from the terrace system, deposits of gravel or sandy clays found at the base of Pleistocene sands or

loesses are equated with the Diluvium of Ladrière, when corroded flint forms the dominant material, or with "Prêles", when chalk and flint debris are mixed. The lithological composition of these deposits and their distribution shows that they were formed when the morphology of Middle Belgium was substantially different from today. These gravels which have been confused often with fluviatile terraces are attributed by Tavernier to altiplanation (reduction of relief by normal erosion) rather than to cryoplanation (reduction by processes operating in extreme cold) which would imply periglacial conditions. He does not believe that solifluction always plays as dominant a role as has been attributed to these deposits by some, notably Breuil. The age of these gravels varies regionally, but they are often post Mindel-Riss as shown by the fact that they cut and erode old soil layers of that epoch and contain their destroyed elements. They are prior to the great deposits of loess, however. Their formation went on continuously from the lower to the upper Pleistocene.

The prêles are not uniformly distributed. Tavernier[1] notes that the greatest concentration is on flattened hill tops. Elsewhere, they are disturbed or only partially developed. Thus, he thinks they are primarily pediment deposits. However much altiplanation is a phenomenon of cold periods, normal erosion is not inconsiderable in an interglacial period. The introduction of the concept of the pediment deposit, originally applied to the dry arid regions of the southwestern United States, is a radical departure from previous

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1 Tavernier 1947.

thought which attributed the prêles almost exclusively to solifluction or river terraces. It represents a valuable contribution by Tavernier, and it seems to explain the often confusing nature of the evidence which sometimes associates the deposits with warm climatic phases and sometimes with cold ones.

Interstratified in the prêles are sands from lower levels, clayey loesses or clayey gray sands. When prêles are formed on Tertiary sands, they often contain thin yellow and red veins derived from below and involuted twisted beds which indicate cryoturbation (phenomena of cold flow, soil creep or cracking).

Covering the prêles is a compact, grayish-brown, sandy loess with irregular yellow or red veining often in large stripes, which Ladrière called the "limon panaché". Tavernier believes that its stratigraphy is not clear for it is the remains of the lower part of a forest soil and can be of different ages.

Capping the "limon panaché" or similar formations in France is a deposit of fine soft loess with black spots of manganese concretions (Ladrière's "limon doux à points noirs"), or similar loesses which are often weathered deeply on their surfaces to a rich ochre, or red clayey deposit which breaks easily in small fragments when dry. This red weathering layer is known as the "limon fendillé" and is generally accepted as evidence of soil formation in the Riss-Wurm Interglacial, with the loesses on which it rests being laid down during the preceding Riss glaciation. The complex capped by the "limon fendillé" is known as the older loess and has been

recognized in Belgium at Pont de l'Agasse, Rocour, Bilsen and Gembloux but not in those portions of the Haine valley which are of interest archaeologically.

Tavernier characterizes the upper Pleistocene as the period of maximum cutting of valleys and subsequent blocking up by deposits of marine origin in lower Belgian or by niveo-eolian or niveo-fluviatile (snow and windblown or river-transported) material in upper Belgium corresponding to the Wurm glaciation(s). There are, he claims, no deposits known with certainty from the Riss-Wurm Interglacial (Igl) in Belgium. (The "limon fendillé" is not a deposit but the weathering of an older sediment.)

The Wurm glaciation was productive of three loesses. An upper loess locally known as "Ergeron", which is yellow and friable, is very constant over great distances and, in Hainaut, the lower part is generally rich in terrestrial shells and well-stratified, with beds of sand in its upper portion. The weathering of its upper surface (the Brick earth) is the illuviation (zone of concentration) horizon of a soil formed under a forest cover of mixed Oak and Hornbeam, as was previously noted. A gravel at the base of the uppermost loess is quite common. Under the upper loess is usually a second loess which is grayish and flaky in character. It is quite high in calcium content, and is rich in surviving terrestrial shells. These include Succinea Oblonga, Helix Hispida, Pupilla Muscorum, Columella Columella. The loess, when decalcified, is a grayish brown. Vegetable matter gives it its color, and the

doublet phenomenon, thought to be due to alternating snows and dry summers with production of fine light and dark bands is common. A loam (weathering horizon) is observed in some cuttings when later solifluctions have not completely destroyed it. The loam manifests itself as a thin layer of gray or white with black particles in a more or less clayey zone which is sometimes slightly reddened (oxidized). The base gravel of the second loess is more developed than that of the upper loess (third loess), and often the lower loess (first younger loess) is completely destroyed in consequence. The first younger loess is similar to the second in character though it rarely bears fossils. It is browner and weathered and dotted with black spots, and it survives only in patches, usually in little thalwegs (stream beds). Being rarely visible, it is poorly studied. The black old soil which is often found at its base indicates that it was deposited quite slowly after the Riss-Wurm Igl. At its base is often a well-developed gravel which rests either on the older loess with its weathering horizon or on pre-Pleistocene terrain. The thickness of these loess deposits is variable, though it attains as much as 30 meters in some places in Middle Belgium. The area covered is much greater than hitherto supposed, extending as far as the southern Belgian Ardennes (Gaume). In the valley bottoms, hill wash of this loessic material often accumulates to great depths, especially in the lateral valleys where it was unable to escape via the contemporary stream system.

In a very recent paper, Tavernier and De Heinzelin[1] have supplemented and modified slightly their views as published by the former. They have given more precise meaning to the question of interglacial soils visible in Belgium and have decided that they merit definite names. They call the soil of the Riss-Wurm Interglacial the Sol de Rocourt and state that it corresponds to the "limon fendillé" of the Paris basin; they call the interstadial soil of Wurm I/II the Sol de Clypot, that of Wurm II/III, the Sol de Kessel. Both have been recognized at numerous points in the country. They reconfirm the existence of three younger loesses on the basis of numerous new observations. Hence the French chronology of Bordes is quite closely paralleled in Belgium. The evolution of the Mousterian is seen as continuing from the Riss-Wurm Interglacial right up to the boundary between the younger loess II and III.

Tavernier and De Heinzelin reaffirm the generally constant character of different facies of loess over considerable distances, especially with respect to the younger loess. In this respect, they show a tendency to attach some importance to lithological description and hence to return in essence, if not in detail, to the principles which guided Ladrière.

The period after the deposit of the younger loess III appears to De Heinzelin and Tavernier to be much more complicated than previously supposed insofar as the traces in the soil which it has left are concerned. Evidence is drawn largely from archaeological data; but since these late phases are poorly represented in the Haine valley, the discussion need not detain us here.

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1 Tavernier and De Heinzelin 1957.

The foregoing is all generally applicable to Middle Belgium as a whole, but each area has its local peculiarities. The valley of the Haine is nearly unique in that it contains these deposits, often in very varied facies, in association with the most important Paleolithic finds in the country. We shall now consider these deposits and their associated flints.

CHAPTER III

THE PALEOLITHIC IN THE HAINE VALLEY

1) Distribution of Sites

Paleolithic sites in the Haine valley are, with few exceptions, concentrated (see map, figure 1) in an arc sweeping south of Mons and following a series of quarries, railroad cuttings, natural sections, etc. Hence the geographical distribution is strongly affected by two unrelated production processes--the production of flint implements in the Stone Ages and the production of phosphate fertilizer and cement in our own times. Modern quarrying activity and railway cuttings are very densely concentrated in just that region where were found the best and most workable flint outcrops. This is not purely fortuitous, in a geological sense, but insofar as it has led to most of the discoveries in just those places where Paleolithic industries are most concentrated, it is a happy coincidence. We cannot be absolutely certain about the distribution of the density of occupation in Paleolithic times for we cannot even be sure that there was anything but transient activity in the region. We have more than enough quarries scattered about the Haine valley to give us a fair picture of the deposits there, and it is only in the arc corresponding more or less to the cuestas of Spiennes-Harmignies and Vellereille-le-Sec that finds reach a high density. These really dense concentrations of finds all occur in a very few square kilometers of the 800 or more square kilometers which make up the watershed of the Haine.

It is curious to note that there seems to be nearly no connection between the Mousterian cave dwellers

at Spy and the flint deposits from the Haine valley, though only 34 kilometers separates the locations. Yet, typologically, the implements from the lower level of Spy and those from Stambruges may be related. We conclude that the greatest density of finds corresponds to the location of the best flint and this may merely indicate that the center of production produces the most waste and hence the largest number of finds, rather than imply any concentration or stability of population.

We cannot speak of mining activity in the Paleolithic period as we can for later times. However, it does seem certain that there was some repeated gathering and working of flint nodules on the spot. In the earlier techniques, the Clactonian and Acheulian, it seems most likely, judging by patina, that stream bed flint formed the more important source. In later periods, the actual strata of the Spiennes and Obourg chalk must have been tapped, but this was probably done from surface outcrops and natural sections. The flint seams in both chalks, where faulting has broken the relevant strata and tilting has thrust up the broken ends, reach near the surface in several series of arcs. These arcs radiate around Mons, and all but three of the important sites in the Haine valley--Stambruges, Caillou-qui-Bique and Leval-Trahegnies--are almost directly related to these outcrops.

2) The Carrière Helin and Its Environs

Discovery and Early Study of the Site: Though not the earliest cutting in the Pleistocene in the Mons Basin,

this quarry or series of quarries was observed at a very early date, and more literature has been devoted to them than to all others combined. The quarries were opened along a line of a series of pockets of the brown Ciply chalk, very high in phosphate content, and extended for one kilometer southwestwards from what is now the Anglo-German military cemetery at St. Symphorien to the Mons-Beaumont road. The traces are clearly indicated on the Carte Militaire within the northeast limit of the Spiennes communal boundary.

A series of entrepreneurs undertook the exploitation of this deposit at different places and times and a corresponding confusion arose in the literature between the quarries of the various MM. Carbon and Van Roy, Quintens, Solvay, Hélin etc. The approximate locations are known[1] of the quarries which yielded most of the finds and whose sections, though overgrown and fallen in, are still visible in part today. We show them on the accompanying map (fig. 1, no. 1).

The first publication of Paleolithic finds from the quarries "of Malplaquet" as they were then called is by Delvaux[2], who claimed a high antiquity for the lowest levels. It was not until claims for the existence of Tertiary man were advanced by Cels[3], based on worked flints found in what he thought to be Eocene (Landenian) deposits, that a commission drew up and published three sections in 1888.[4] Another series of sections was published in 1889 by Mourlon.[5] In 1890, De Munck[6] noted the finds on his map and summarized the

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[1] Largely through Dossier 151, Service Géologique de Belgique and the unpublished field notebooks of Delvaux and Mourlon in the possession of the Service Géologique.

[2] Delvaux 1885/6.
[3] Cels 1887/8.
[4] Cornet, Delvaux, Houzeau 1887/8.
[5] Mourlon 1889.
[6] De Loe and De Munck 1890.

existing literature.

The first attempt to correlate the cutting with the general north French sequence of Ladrière[1] was made by De Munck in 1891[2]; he published still another version of the section, the result of his excavations in that year. In 1892, Ladrière[3] visited and studied most of the cuttings in the Mons Basin then visible and attempted to integrate the deposits into his north French sequence. Utilizing this work, Rutot[4] summarized the cuttings in the area in late 1892.

In early 1891, the Ecole Anthropologique de Paris went on excursion in Belgium and, since the deposits of the Mesvin trench were no longer visible, the students under the elder De Mortillet visited the various St. Symphorien quarries. The excavations of De Munck were then in progress and his section is reproduced by De Mortillet[5]. The problem which interested De Mortillet and his students most at that time naturally centered around Delvaux's "Mesvinian". De Mortillet had been present at the excursion of 1872 during the congress in Brussels and, hence, was one of the very few people to have seen all the cuttings.

As he observed, controversy centered around the date of green sands (see figure 2) with criss-cross stratification and their base gravels. He noted that the great majority of flints in the collections of De Munck,

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[1]Ladrière 1890.

[2]De Munck 1891.

[3]Ladrière 1892a, 1892b.

[4]Rutot 1892.

[5]De Mortillet 1891.

De Loe, Cels, Neyrinckx etc. were naturally fractured though there were some genuinely worked pieces, especially from the St. Symphorien phosphate quarries. He goes on to note that "the (worked) flints in general belong to forms proper to the Mousterian but, of all these forms, the disc seems to predominate". He notes, for the first time, the differences in the state of preservation of objects from the base gravels and from the green sands, but thinks that this can just as well be due to the gravels containing blanks and unfinished pieces as anything more complicated. It is interesting to note that he makes no mention of rolling or abrasion though the idea that the gravels and the green sands contain at least some elements of the same industry was novel and was not picked up again until Breuil revived it in 1934[1]. De Mortillet distinguishes, on the basis of patina, the disc nuclei of the base gravels from those in the green sands but thinks that the latter were brought from elsewhere to be completed. He recognizes quite clearly the existence of a quite separate layer at the base of the loess which is clearly Mousterian with bifaces. He definitively rejects the term "Chellean" for the assemblage, which the Belgians had used up to that time, and notes that this is merely a facies of the lower Mousterian. He notes that no true "Chellean coup de poing" has ever been encountered at Hélin, an observation also made by De Heinzelin and passed on to Bordes some 60 years later[2]. The fauna in the whole area, especially in the contiguous quarries, is always characteristic of the middle Quaternary. Elep. Antiquus and

[1] Breuil and Koslowski 1934.

[2] Bordes 1951.

Rhino Mercki were absent, though present in other parts of Belgium. This, said De Mortillet, contradicted Delvaux's view on the antiquity of the base deposits both here and in the Mesvin trench. The flints are Mousterian or Acheulian, but none are even remotely Chellean. He compares the situation with Scarabelli's finds at Imola where the lower Quaternary as well as the Pliocene and Miocene are also absent.

In retrospect, we admire the level-headedness of De Mortillet who saw quite clearly through the mass of claims and counter-claims made for the deposit at the time. The broad outline of his conclusions rests undisturbed today.

The Quarry Today: Varied interpretations arising out of these early observations laid the foundation for a divergent analysis of the geological sequence which is reflected in nearly a score of later articles[1]. On the whole, however, the observations in the field more or less agree, providing one is cognizant of the fact that the same descriptive term for a particular facies did not always mean quite the same thing to each of the authors and that subtler variations which are seen today did not strike them as important. It is the chronological interpretation of the cutting which has been most disputed, and this is not surprising, for the Quaternary in this area is indeed complex and, in many respects, atypical.

All the quarries are opened along a line which nearly corresponds to the 55 meter contour in a flat depression which may at one time have been a branch of

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[1] Rutot 1902, 1903, 1919; Commont 1912; Hamal-Nandrin 1912; Cornet 1909; Cornet 1927; Breuil 1932, 1934, 1935; De Heinzelin 1949; Bordes 1951a; Van Damme 1936; Ceb 1903; Stevens 1938; De Loe 1927; Burkitt 1925 to give a partial list

the Trouille or some now-unknown tributary of the Haine. The geological map at 1:40,000 in the edition of 1902, sheet 151, shows a heavy deposit of valley alluvium passing to the east of Mt. Panisel and the Bois de Mons, just a short distance northwest of the quarry area. Part of this may also be the washout from a large ravine on the east slope of the Bois de Mons facing the Mons-Beaumont road and need not be an indication of the river's presence further south. This deposit links up with the modern alluvium of the Trouille just north of Spiennes and the place name, Marais, is preserved for part of St. Symphorien on the older versions of the military maps. The source of heavy material in the eolian deposits probably was the cuesta of Spiennes-Harmignies, which would account for the high proportion of chalk in the loess, while considerable Tertiary sand of Eocene or late origin could have been blown or wahsed into the depression from the same source. Solifluction or altiplanation deposits are also possible, running down the northern slope of the cuesta of Harmignies, and these would naturally contain a high proportion of flint debris.

The Carrière Hélin, as visible today, is now a tumbled mass of weeds, small saplings and underbrush which, considered together with collapse of most of the quarry walls, makes observation extremely difficult[1]. Fortunately, however, a small portion of the section has been kept relatively clear of debris, though not to the lower levels. The section preserved must be very nearly as that recorded by most of the writers/in the

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[1] Since this was written, De Heinzelin has undertaken a new excavation and cleaned and fenced the site. The results are as yet unpublished.

extreme southwest corner of the quarry, and it is certainly that seen by Breuil in 1932. A photograph of the Abbé taken during his investigation at the exact spot is preserved in an unpublished notebook of Jean Houzeau.

Debris falling from the upper levels, together with accumulations from repeated cleanings of the quarry face at the bottom, has made it difficult to see anything below the upper green sands without undertaking a major excavation. The section (see figure 2) is capped by a very thick layer of mixed debris upon which a humus layer has re-formed during the years of neglect. Beneath that, the old humus layer is visible, with weeds still growing out of it in the summer. The soil profile is complicated and not clearly discernible over such a small section (not more than three or four meters at most are visible horizontally). The brick earth formed below the modern soil is exceptionally thick and well-developed and contains some irregularities which are too diffuse to interpret exactly. It may possibly represent some advanced stage in the formation of a washed-brown earth soil.

The brick earth is the illuviation (B) horizon of a soil formed under a forest cover of Oak and Hornbeam in the post Allerød period. In places at Hélin where it is separated from the cultivated layer of the 19th century, there are indications that the eluvial horizon may survive. Thus, this brick earth at Hélin is formed by a pedological process which may correspond to Dudal's[1] type 4, a washed-brown soil not yet approaching the stage of podsolization. That indicates that the

[1] Dudal 1953.

forest cover was terminated at a relatively early phase before the process of leaching was carried through to its final stage. As we discuss elsewhere, this is fairly typical throughout the upper Haine valley and the moderately early termination of the forest cover, in whole or in part, can probably be connected with the introduction of agriculture during the middle Neolithic period. It is not possible, on the basis of the small section preserved at Hélin, to make a reasonable statement about the position of the Neolithic material in the section with respect to the soil formation. It must be remembered that the washing process which results in the downward migration of the finer particles of clay in the original loess and their concentration in a band which forms the brick earth is not something which began suddenly or which stopped abruptly. It is possible that the flints found in the brick earth have descended somewhat from their original positions on the surface and, hence, are not really in place. It seems reasonable to suppose that this brick earth is largely pre-Neolithic in its formation and that the actual soil in Neolithic times was, within the limits of observation, the bottom of the old humus which is mixed by ploughing with the old eluvial horizon in the 19th century cultivation layer, or nearly so. In the limited section preserved at Hélin, no post-Neolithic hillwash as such was observed.

The younger loess on which the brick earth is formed is quite typical, light, fine, yellow-brown in color with marked spots of white chalk which streak when cut in troweling the face for observation. Towards the bottom of this deposit are a series of alternating

lighter and darker bands with rather irregular stratification, though not a criss-cross stratification in the usual sense, which might indicate hillwash of earlier material. Below this phase of the deposit is an involuted bed, a cryoturbation phenomenon, as is common in many Belgian cuttings of the younger loess III. The involution might be accounted for by a bit of flow in one or more phases, but the question requires further study and analysis of the deposits themselves by means[1] which were beyond the resources of the writer.

At the base of this loess, there is a sparse gravel layer not exceeding several centimeters in spots and completely absent in others though, in some instances, it is visible as slight coarsening of the bottom of the loess deposit. It is generally supposed[2] that the gravel at the base of the younger loess III is due to solifluction.

In general, no soil built upon the younger loess II is recorded by any old observations, but traces are indeed visible in the cutting at Hélin. The youngest loess rests on a definitely-reddened layer of loess or, more precisely, a gray layer with reddish spots which sometimes reaches 15 cm. in thickness, though it is by no means uniform. It is considerably eroded from above and vanishes altogether in some portions of the cutting. This layer quite clearly seems to represent the much-eroded remains of an old soil layer, probably that of the last interstadial (Wurm II-III) and should be taken as the true dividing line between the younger loesses in the cutting.

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[1] Granulometry.

[2] Tavernier 1949.

The deposit of the younger loess II resembles the yellow-brown, fine material above with spots of chalk of the upper portion, though the horizontal stratification is less pronounced. It, too, is divided into zones and has convolutions towards its base. The base itself is marked by a very thin gravel, scarcely exceeding a centimeter or two, and often absent in spots. It is difficult to see how some of the other investigators, especially Breuil, were able to think of this whole complex as a gray loess, for it is certainly anything but gray in color. No fossils were found by the writer in the deposit, though they have been claimed for it by others and are standard in the younger loess II.

The old soil which has been observed by all writers at the base of the loess complex, and taken by Breuil to be interglacial, is a rather involved affair. To begin with, it is much eroded by the thin gravels above and, in spots, is less than 5 cm. thick. It is composed of a variable number of layers, depending upon the portion of the section examined. In general, it begins with pockets of yellow-whitish sand which are visible in a confused relationship with the base gravel above in two places. These whitish sands have a striated appearance and seem to represent the traces of an eluviation horizon, while the darker bands below represent the illuviation layers. We note its consequent similarity to a soil profile on the older loess observed by Manil at Gembloux[1]. The lower horizon starts with a gray layer which is reddish-brown on top or, more precisely, has reddish spots disseminated throughout its mass becoming more concentrated towards the top. The

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1 Manil 1952.

deposit is decidedly coarse and rather sand-like, and the overall appearance when seen from only a little way off is that of a smooth brownish band.

This old soil layer seems to have been formed on remains of a Wurm I loess, mixed with the sandy deposit below which is greenish-brown in color, though the exact coloration seen depends strongly on the humidity conditions at the moment. The greenish-brown deposit merges into an ocherous sandy deposit which averages perhaps 10 cm. in thickness and is somewhat lighter in color and contains occasional pebbles, though these do not seem to be arranged in beds in the visible parts of the cuttings. Below come horizontally-banded gray-green sands, containing yellow streaks, of about 30 cm. thickness. Below that point the famous green sands with criss-cross stratification begin, though in reality their color is more nearly a yellow-brown with blackish spots. It seems difficult to imagine that this very slight soil complex must represent the entire process of soil formation during the last interglacial, which is what would be implied by accepting Breuil's Rissian dating for the green sands below on which it is formed. It is for that reason, as well as because of the warm Mousterian found in them, that we have been led to classify the green sands and their contents as interglacial, even though in doing so we realize that we run counter to Tavernier's generally-accepted assertion that no interglacial deposits are known with certainty in Belgium. There seems to be no other reasonable explanation which accounts for both the archaeological finds and character of the geological layers.

An unpublished section of the cutting made by Paul Dumon can be found in the notebook of Jean Houzeau. It was recorded by Dumon in 1932 before the visit of the Abbé Breuil when the cutting had just been freshened in preparation for that event. His observations correspond quite well with what has been described above, if allowance is made for differences in terminology. Because his description of the upper layers corresponds so well with what the writer has seen, it seems justifiable to place some reliance upon his comments on the now invisible lowest layers. Under the green sands with criss-cross stratification, he saw a whitish-grayish sandy deposit with a thick flinty chalk gravel (prêle) at its base, the whole lying on the weathered surface of the chalk. Unfortunately, the nature of the weathering of the chalk is not specified.

Interpretations: Commont observed[1] that the base gravels at Hélin were situated at several meters above the watercourse of the Haine and, hence, assumed that these represented the lowest terrace of the Haine tributary, the Trouille, implying that all except the two loesses were terrace deposits. He does, however, decisively point out for the first time that the second loess in the cutting does not correspond to the middle Quaternary of Ladrière (as had been previously thought) but is a younger loess. Ladrière had, of course, interpreted this as the representative of his "limon gris à succinées", but Commont says that Ladrière never thought to assign the entire mass to the middle Quaternary which he believed never descended so low into the valleys. Further-

1 Commont 1912.

more, according to Commont, this layer, judging from its fauna and its industries, belongs to the lower division of the recent loess.

Rutot based his later analysis[1] on an attempt to construct a system for the whole of Belgium, including the Haine valley, upon the terrace chronology worked out for the Somme valley by Commont[2]. In fact, the paper read before the Geological Society is introduced by a shorter paper explaining the system of Commont in some detail. In the main paper, Rutot introduces the concept of a 100, 60, 30-40 and 3-10 meter terrace for the Haine and a corresponding system for the Trouille, its tributary. A similar series is proposed for the Senne, the Lys and the Meuse. The Carrière Hélin is supposedly situated on the lowest terrace of the Trouille (Hallez proposed[3] that the Haine at one time joined the Trouille at the foot of Mt. Panisel). The bottom of the lower terrace is then supposed to be only 2 meters above the level of the river itself, though more than a kilometer away from it.

One deduction which Rutot drew from the terrace argument is that, if the ensemble of the two fluvial sands and the upper paleosoil can be compared with a similar peaty layer on the lower terrace at Montières, the whole would be synchronous with the "limon rouge fendillé" or last interglacial rather than with the lower term of the Quaternary as had been thought all along.

Cornet published a version of the cutting[4] which he based on the original reports of Ladrière, De Munck

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[1] Rutot 1919.

[2] Commont 1913.

[3] Hallez 1914.

[4] Cornet 1927.

and Commont (and evidently too on Rutot of 1902 and 1919), but it is clear from some of the details that he added some descriptive material based on first-hand observation. Following the then-prevalent theory, Cornet attempts to equate the old soil layer below the younger loess with the summit of a terrace deposit at 47 meters, 12 meters above the alluvium of the Trouille at the foot of Mt. Panisel. Hence, he thinks that we have to deal with a Monastirian terrace which ought to be 18 to 20 meters above the bottom of the valley. He equates with this terrace deposits ranging in altitude from those of the Mesvin trench at 10 meters above the By up to those of the Spiennes trench from 20-27 meters above the Trouille. It is obvious, however, that the possibility of subsidence requires that the measurement should have been made to a buried channel of the Trouille. Clearly, judging from the criss-cross stratification in the green sands, the soil layer, the rolled flints in the main gravels at the base of the Quaternary and, above all, from the fauna, it seemed reasonable to suppose in 1927 that the lower layers do indeed represent riverine deposits.

Breuil[1] claimed, following the theory of Commont, Rutot and Cornet, that Paleolithic sites in the Haine valley are located on a series of river terraces. He asserts that these terraces at 65 to 35 meters absolute altitude are the middle ones, corresponding to the high and middle terraces of St. Acheul and hence to the Gunz and Mindel glaciations, while the lower terrace of 15 to 10 meters involved at the Carrière Hélin is Rissian. Altitudes taken to modern alluviums do indeed approximate these broad figures.

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[1] Breuil 1932.

Breuil and Koslowski made perhaps the most ambitious attempt[1] to deal with the valley of the Haine and the Carrière Hélin in particular. Breuil's study of the Carrière Hélin was based on some field observation, and a small portion of the cutting was freshened up for his observation by Jean Houzeau in 1933[2]. Furthermore, he spent a small amount of time examining the material in the Musée d'Histoire Naturelle and in the Cinquantennaire in Brussels. However, the care with which the series of articles themselves were prepared is in some doubt, with illustrations shifted about and confusion of finds from one quarry with another. It is generally understood among the majority of French and Belgian prehistorians at this time that the entire question of the Somme valley sequence upon which this work is based will have to be reworked.

Under the tutelage of Breuil, R. Doize[3] gave some further attention to materials from the base gravels at Hélin and published the results in 1935. She stressed the solifluction nature of these base gravels, which had been claimed by Breuil, and reprinted the section which Breuil had used in 1934. Doize reclassified the material from the Prêle in the Brussels Musée d'Histoire Naturelle more carefully than the Abbé Breuil had done, employing the criterion of degree of wear. She arrives at three series, as does Breuil--a very rolled Clactonian, a less rolled "proto-Levalloisian" and a fresh Levallois IIIa in black flint--and, carrying the division still

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[1]Breuil and Koslowski 1934.

[2]Personal communication.

[3]Breuil and Doize 1935.

further, she suggests that the brown flint component of the unrolled might form a Levallois IIIa2! These are admitted to be typologically inseparable from those in black flint of the second level (surface of the gravels) of Breuil.

We need not dwell on the confused nature of the finds and the lack of precision in the determination of which piece comes from what level. It seems dangerous to attempt too fine a division on the basis of appearance and wear, especially inasmuch as the material of the various "Levallois" levels is all very similar. It seems far more likely that the unrolled pieces found their way into the Prêle through careless collection of the finds or by descent from the layer above. The work of Rutot in 1902 is quite questionable, and it is doubtful that the stratigraphic position which he assigned to the pieces can be trusted. De Munck's finds were further confused when Rutot disorganized the reserves of the Musée d'Histoire Naturelle. All the old finds brought by workmen to the various collectors can certainly not be trusted as to precise position. We assume that the rolled pieces belong together and come from the Prêle and that the unrolled pieces come from the surface of the Prêle, and no more than that.

The most recent published study dealing, among other things, with the Hélin material, that of De Heinzelin in 1949, is a summary of the existing state of affairs prepared for the reorganization of the exhibits in the galleries of the Musée d'Histoire Naturelle in that year. In that article, he poses for the first time some of the objections we have raised against considering the base gravels of any of the Quaternary sections as part of a

river terrace system which can be analysed altimetrically. His generalized synthetic section for the whole area, with the place of industries in each, is useful as a guide, but it is not intended to be sufficiently detailed for a complete study of any one quarry.

The Finds: The finds of implements reported from the gravels of the younger loess (figure 3) correspond to Breuil's Levallois V which Bordes and Commont place in the base gravels of the younger loess I. Some instruments preserved in the Mons museum coming from this layer, as well as others in the Cinquantennaire, have a strongly upper Mousterian aspect. However, since the Mousterian with bifaces and that without bifaces cannot obviously be separated simply by examining the old finds, we must conclude that there is no definite proof of industries in place at the base of the younger loess II at Hélin.

In a short note, Hamal-Nandrin[1] observed that the Mousterian flints in his collection from Hélin, especially certain Levallois points and scrapers, compared quite exactly with the material from the second level at Spy, a comparison which is rather specious because it is limited to a few types which enjoy a very long life. The finds from the Hélin deposits are typical of the base of the younger loess I and make it highly unlikely that there is any relationship between them and the developed Mousterian of the interstadial deposits at Spy. Some of the pieces among the Hélin finds in the Musée d'Histoire Naturelle might have come from layers other than the base gravels of the younger loess I but, in the absence of any reliable stratigraphic indications, the comparison

[1] Hamal-Nandrin 1912.

seems unsafe. It is perhaps better to assume a longevity of type rather than an exact comparison of cultures, even though the two sites are only 35 kilometers apart.

Any attempt at statistical analysis of the tools from the younger loesses I and II at Hélin would be fraught with the danger that one is in the presence of industries mixed in collection. Separation by patina or condition of eolisation cannot be attempted. Since the possible industries are old Mousterian (as already identified), younger Mousterian without or with rare bifaces, to say nothing of terminal Acheulian, the separation would not be easy. De Munck[1] speaks of worked flint of Acheulian and Mousterian form with fauna of Mammoth and Rhinoceros. This sounds very much like the older Mousterian with bifaces or the Mousterian of Acheulian tradition. The flints from the loess gravel are distinctly black or gray and difficult to mistake, though well-patinated specimens are attributed to it. De Heinzelin[2] describes them as big Levallois flakes and bifaces which are not numerous. Breuil notes[3] that Levallois flaking dominates. Occasionally, the bulb of percussion has been suppressed by subsidiary flaking which Breuil thinks to be typical of the late Levalloisian (VII) of the Somme valley or, to use the more modern terminology, of the typical Mousterian without bifaces. This is but another indication of the possibility that the flints from this layer may be mixed, with those from

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[1] De Munck 1891.

[2] De Heinzelin 1949.

[3] Breuil 1934.

the base of younger loess I predominating but those from the base younger loess II in evidence. Discoidal nuclei are common and are very carefully prepared, mostly for striking triangular flakes which are very numerous. Blades are not common in the gravel base of the loess, though a few quite thin ones do occur (fig.3, no. 1).

The Levallois flakes from the younger loess base gravels are often very large (fig. 3, no. 3). This was remarked on by Breuil, and it can be easily confirmed in any of the collections. Retouching of the edges is a common feature (fig. 3, no. 2, a knife). The unifaces (fig. 3, no. 5) are made on very large Levallois flakes, carefully retouched. Tortoise cores (fig. 3, no. 4) are frequent as are Mousterian points of various types (fig. 3, nos. 5-8).

The general aspect of the industry, leaving out the material which might represent inclusions from upper layers, is not unlike material from similar stratigraphic positions in the Spiennes trench, the Carrière Solvay of Mesvin-Ciply and some of the surface material from Vellereille, Obourg, the Bois de Peissant and a number of isolated finds in Mons itself.

The predominance of triangular unifaces and other characteristics mentioned above lead us to place the industry, insofar as the pure elements can be isolated, in the class of Mousterian of Acheulian tradition, as defined by Bordes[1]. The nearest comparable series in his study are from Tillet (café au lait patina) and Bihorel series III (whose blades and points are strikingly similar). both are from the base of the younger loess I. Micoquian

[1] Bordes 1954.

forms coming directly from the base of the loess at Hélin are absent. The occasional denticulated instrument reminds one of Bordes' Evreux, but the comparison of pieces shows that the relationship is not close. The implements approach closely those classified by Commont as lower Mousterian in 1913, with implements in the same stratigraphic position at St. Acheul, Catigny, Montières, etc. Commont aptly says that this industry can appear to be Acheulian if one considers only the hand axes, but it is the smaller assemblage of scrapers and Levallois points and the cold fauna which distinguish it as Mousterian. Zeuner[1] thinks that the presence of very large flakes in such an industry may be accounted for on ecological grounds. That may be so but, at Hélin at least, the excellent flint available (that from the Senonian chalk) certainly facilitated the task.

The question of industries from the illuviation and eluviation horizons of the old soil formed during the early phases of Wurm I is a vexing one. Direct, first-hand reports for industries in the layers concerned are few. De Munck[2], in reporting on the excavation he directed for Louis Cavens, speaks of the gray-green "glaise" with ferruginous spots and gravel having at its base worked flints resembling those of the sands below. Rutot in 1919, speaking of the same layer and its base gravel, reports an incompletely-developed industry with coup-de-poing recalling those of the "Chelléen évolué". Presumably he is using the terminology of Commont who employed the term to describe the late Acheulian or Micoquian. Cornet[3] gives a slightly

[1]Zeuner 1952.
[2]De Munck 1891.
[3]Cornet 1909.

contradictory bit of information when he says "there is gravel at the base of the glaise containing 'haches en amande' which are noticeably less well-worked than those in the gravel of the base of the younger loess". In the Musée d'Histoire Naturelle in Brussels, there are flints which have been assigned to the gravels, but they are not mentioned in De Heinzelin's summary and there are certainly no bifaces in this collection. Breuil and Koslowski[1], in any case, do not speak of industries of any kind from the soil layer or the glaise. Until De Heinzelin's further field investigation is published, the question must remain in abeyance.

Industries from the green sands (figure 4) are reported in almost all instances. Breuil has classified them in two levels belonging respectively to his Levalloisian IIIb and IV, the whole dating from the last interglacial. He failed to distinguish the several layers in the green sands and creates two arbitrary levels for these implements in the green sands themselves. In fact, most of the other reports speak of the flints as disseminated throughout the mass of both these bodies without specifying more precisely. On the basis of patina, the flints in the Mons museum, the Musée d'Histoire Naturelle and the Cinquantenaire cannot be assigned closely. Those coming from the sandy layers are, in general, little disturbed or eroded and have been taken as being unrolled. It seems reasonably clear that we are at one point in the presence of an atelier, judging from the large number of chips or working debris (fig. 4, no.2).

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[1] Breuil and Koslowski 1934.

The flint exploited seems that of the brown stream or base gravels and the black Senonian Spiennes chalk for the most part, and we might suppose that an encampment was located on the edges of a small stream with exposed outcrops of flint. Later, with increasing rainfall in what might be a wet episode in the Riss-Wurm Interglacial, the stream rose, its load increased and the green sands were deposited over the atelier, though the event was certainly not a precipitous one. The criss-cross stratification is an indication of a stream with some current, but it need hardly be a raging torrent. Concerning the implements themselves, it is difficult to see the separation between the Levalloisian IIIb and IV postulated by Breuil, and it may be reasonable to suppose that we are in the presence of a simple warm Mousterian complex (fig. 4, no. 1). The technique is frankly Levallois as far as the scrapers go, and there are numerous neclei and wasters (fig. 4, no. 4). Facetted butts and suppression of the bulb of percussion are common (fig. 4, no. 3). The entire assemblage was first compared with the "warm" Mousterian of Commont (Montières) by Breuil himself, and there is no reason to contest this attribution. The high proportion of scrapers and wasters here may be due to the fact that this is a chipping place and not to any cultural distinctions. Vaufrey[1] has criticized the entire concept of the "Mousterian à faune chaude" or Levallois III-IV. In any case in the classical deposits, according to Commont, the warm Mousterian is not found under the Acheulian. De Heinzelin[2] bypasses the question by denying Breuil's assertion that there are bifaces of Acheulian and Micoquian aspect associated with

[1] Vaufrey 1946.

[2] In Bordes 1950.

these green sand industries. But what of figure 4, numbers 5, 6 and 7 which have a patina like the green sand pieces? The whole question with regard to these industries is at the moment in a state of flux and a geological deposit as atypical as the fluvial sands in the Carrière Hélin is hardly useful in elucidating the problem. More certain are the industries from the Prêle gravels below the green sands (figs. 5 and 6). If we leave out of account Rutot's later imaginings of eoliths in stratified gravels, there emerge two quite distinct industries. On top of the gravels (fig. 5), little rolled, is another middle "Levalloisian" affair whose interpretational problems and character hinge on the solution of the green sand industries. Its separation from the other material of the gravels is based on patina and lack of rolling, and it is not impossible that it is the same as the green sand industries.

In a rolled and somewhat damaged condition in the base gravel comes a primitive industry (fig. 6) first thought to be eolithic. Both De Heinzelin[1] and Breuil[2] reserve the attribute of "Mesvinian" for it. Breuil regards this as a primitive Levalloisian (fig. 6, nos. 5, 8-11) though of slightly different facies, differing from his Levallois I and II in the absence of tools of Mousterian aspect, the absence of a good flat retouch and the absence of any hand axes. He considers the "Mesvinian", therefore, as the first glimmerings of the Levallois I. His Levallois IIIa on the surface of the gravels are thought helpful in dating and he places them in the first periods of erosion

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[1] De Heinzelin 1949.

[2] Breuil 1932.

of Riss. This leaves too large a gap, since the nearly identical green sand industries are supposedly interglacial. Therefore, he classes his "Mesvinian" as pre-Rissian. It seems reasonable, as we have proposed above, that the whole warm Mousterian complex is interglacial and that the gravels are of the last phase of Riss or even early interglacial and, hence, the Breuil "Mesvinian" cannot be later than the early interglacial. Of course, as a rolled deposit, it could always be earlier still.

Clactonian technique (fig. 6, no. 1, 2, 6, 7) is common in this assemblage and, were it not for the absence of bifaces, it would be tempting to see merely a middle Acheulian waster assemblage. That would accord quite nicely with contemporary views upon the chronology of the middle Acheulian and the origins of Levallois technique. Inasmuch as Bordes seems to have undermined the idea of an independent Levallois industry and, above all, a Levallois I-II on the lower terrace of the Somme of pre-Rissian age, it seems scarcely worthwhile to separate the industry of the base gravel at Hélin from the middle Acheulian complex. Still, this seems to be the only deposit of its type apart from Cagny[1], and it deserves further study. The base gravels were not visible in the cutting as viewed by the author, and we have not been able to verify any of this at first hand except in the examination of the oft-jumbled museum material. We cannot personally see the great utility of a subtle distinction between the Breuil "Mesvinian" and the frankly Clactonian pieces in this deposit because

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[1] Breuil and Kelley 1956.

both are patinated identically and heavily rolled.

3) Tranchee de Spiennes-Mesvin

History of the Site: The early 60's of the last century saw an enormous increase in railroad construction in Belgium. Typical of this construction activity--which paid great though unexpected dividends in the understanding of the geology and prehistory of much of the country--were large cuttings, monumental tasks of earth-moving for their time. A rather minor spur railroad carries traffic from Mons to southern Hainaut. It passes south of the Mons station, which is located in the flatlands of the Haine valley, and describes a great arc through Cuesmes south of Mount Eribus and heads southeast. After crossing the By, it slices into the hill of Mesvin (fig. 7, top) which separates the By from the Rivière de Nouvelles. This hill is bisected in a north-south direction by one of the many dry valleys of which we have spoken elsewhere. Hence, the trench of Mesvin has two parts, an eastern and a western. The railroad crosses a bridge over the Rivière de Nouvelles and bisects the large hump of the ridge separating that stream from the Trouille. The resulting trench has been given the name of the Tranchée de Spiennes in the literature. After crossing the Trouille on another pair of high arched bridges, the line continues to slice through part of the Spiennes-Harmignies cuesta, cutting in turn part of the Camp à Cayaux of Neolithic flint mine fame. It reaches the level of the Trouille somewhat before the Mons-Beaumont road northwest of Harmignies. A great deal of earth was moved, exposing a section which, if considered

as a whole, is almost four kilometers long. The main group of Neolithic flint mines sectioned by the cutting is located between the left (west) bank of the Trouille and the right bank of the Rivière de Nouvelles. Paleolithic flints were found in three of the four trenches--the eastern and western sections at Mesvin and the Petit Spiennes trench. No finds are reported from the section cutting the Camp à Cayaux on the right bank of the Trouille.

As early as 1851, A. Tolliez[1], who had a great collection of the Neolithic material to be found on the surface at Spiennes, considered the area to be a great axe factory. He thought that all of the material came from a geological position above loess and hence was relatively recent. He was quite correct as far as the Neolithic material goes but to C. Malaise[2] in 1866 goes the honor of identifying the first Paleolithic material in the Haine valley, correctly placed at the base of the loess. He also conducted the first excavations and presented a synthetic profile of the Petit Spiennes hill. His failure to separate the Neolithic axe factory material from the genuine Paleolithic material further down was soon seen to be incorrect after the cutting of the railroad trenches.

Cornet[3], in early 1868, was quite able to note that there were two periods of activity at Spiennes, the first represented by the Neolithic mines and the surface debris, the second represented in the finds at

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[1] Tolliez 1851.

[2] Malaise 1866.

[3] Cornet 1868.

the base of the loess. Malaise, however, correctly assessed the hand axes from the loess base by comparing them with finds from Abbeville and Amiens. He recorded the first sections of the hill, obtaining his data from the shafts of flint quarries opened at that time to provide the faience industry at Nimy with raw material--much of which was gathered by exploiting the old Neolithic mine shafts. From the hollow way leading from Petit Spiennes to Mesvin--the "Chemin de Mesvin", a site which we discuss later--he obtained a middle Acheulian hand axe. This is the first recorded Paleolithic find from the whole area found in geological context. He also published a cordate hand axe, though the exact location of the find is not specified. Unfortunately, some of the specimens Malaise also describes are Neolithic axe blanks.

The cutting of the railroad trench, carried out from 1864-67, was followed with interest by local geologists. It is to them that we owe the first and, it might be said, the most thorough report. They published one of the sections in early 1868 and the others followed later in the year[1]. They were published, however, in a provincial journal and did not receive prominence until the Prehistoric Congress of 1872. The text was reprinted in shortened form together with the illustrations used in the earlier works[2]. The sections drawn by F. L. Cornet, together with the Paleolithic material examined by A. Houzeau, are models for their time and have required little revision since they were first made.

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[1] Cornet, Briart, Houzeau 1868a and b.

[2] Cornet, Briart, Houzeau 1872.

Today, unfortunately, the trenches are much overgrown and it is no longer possible to see the section. Hence, we must depend upon these old reports.

The Sections and Their Interpretation: Taking the cuttings from west to east, we begin with the western half of the Mesvin cutting (fig. 7, middle). Under the modern soil, F. L. Cornet observed brick earth over the whole length of the cutting. It is developed on homogeneous upper loess (younger loess III) throughout most of its length. Below this loess came a sandy loess with thin beds of pure sand undulating throughout (a cryoturbation effect at the beginning of Wurm III); then a layer somewhat more sandy still, containing shells of the terrestrial Succinea, Pupa and Helix (corresponding, we think, to younger loess II). Further down, sandy loess alternated with undulating beds of sand (again, cryoturbation) and was followed by a sandy loess (equivalent to younger loess I) with lumps of altered Tertiary sand stratified obliquely and containing Rhinoceros Tichorhinus and Mammoth bones. Then, at the bottom, a thin bed of angular flint rested upon Tertiary sand which is weathered on top. This, we think, represents the last interglacial. No mention is made in the text of 1872 of finds of Paleolithic flints in the western half of the trench. This was first recorded by Delvaux[1].

The eastern half of the Mesvin section was somewhat less complex than the western half and most of the first reports of Paleolithic finds concern this part (fig. 7, bottom left). In the overall view of the

[1] Delvaux 1887/8.

three sections, it can be seen how erosion in the dry valley between the east and west Mesvin section has removed all of the layers, leaving only the brick earth which probably formed after the valley itself was completely scoured out. The complex sequence of sandy loesses in the western half is replaced at first by a simple upper loess, resting directly on a pediment deposit. Finally, even the Tertiary sands disappear between the two Mesvin cuttings. In the eastern cutting, Cornet and Briart show clearly how first the uppermost loess reappears, and they note that it contains thin beds of flint which are quite unworn. The brick earth over the whole contained a Neolithic "foyer" with some fragments of pottery. Under the loess--though somewhat discontinuous in places and quite thick in others--comes a well-developed gravel composed of two layers, one made up of small pebbles of chalk and fragments of flint together with bones and Paleolithic flints. Another gravel follows, made up of broken flint with some flint and chalk pebbles and fragments of Devonian sandstone and Tertiary sandstone. Under the whole lies the eroded surface of the Eocene Landenian sand. The two gravel layers are said to have furnished Elep. Primi, Rhino. Tich., Ursus Spel., Felis Spele., Megaceros hibernicus, Cervus tarandus, Bison europaeus, Equus caballus and Helix ericetorum, together with a great number of worked flints. These flints were found in place by Cornet and Briart during the actual construction of the railroad, and G. Neyrinckx continued their collection afterwards.

Desor, one of the visitors to the site at the time of the congress in 1872, remarked that a thin

brown layer (5 in our drawing) was visible at the top of the Tertiary sand in contact with the base gravels[1]. He thought it to be an old soil which preceded the deposit of the Quaternary gravels. Cornet recalled having encountered fragments of silicified wood in this brown layer, coming perhaps from the Tertiary layers in which petrified trees are frequent.

The Petit Spiennes trench (fig. 7, bottom right) shows clearly the shafts and galleries of Neolithic flint mines; this part of the section is presented in greater detail in figure 36 and is discussed in Chapter VI. We note that the Pleistocene stratification observed by Cornet, Briart and Houzeau was more regular here. Sloping gently upwards towards the east, the layers are converted to brick earth to a considerable depth. It is developed on the upper loess or "Ergeron", which reaches a thickness of four meters. In the western part of the cutting the "Ergeron", which we equate with the younger loess III, lies on a sandy loess which contained some bones, and it in turn lies on gravels containing numerous worked flints--the whole resting on weathered Landenian sands. As one moves eastwards, the lower loess disappears and the "Ergeron" rests directly upon the base gravels. At the extreme eastern end of the cutting, the gravels rise obliquely, together with the Landenian and the brick earth, and the upper loess vanishes entirely; the formation is an altiplanation and stream bed deposit resting directly upon the chalk. The deposits are said to be identical with

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[1] Quoted in Cornet, Briart, Houzeau 1872.

those of Mesvin and contain worked flints and Mammoth and Rhinoceros bones in the base gravel, as in the western half of that trench. In the center of the cutting, the talus consisted entirely of Pleistocene layers to a depth of 12 meters and the lower sandy loess (probably younger loess II and remains of younger loess I) alone had a depth of 4 meters.

By 1885, only 18 years after the first reports, the trenches were for the most part no longer visible. Delvaux reported[1] that, in the western section of the Mesvin trench, he and Neyrinckx had found over a period of years flint flakes which looked quite a bit older than the remainder of the material which came from the base gravels of the loess. This material he called "Mesvinian" and thought it to be probably pre-Quaternary. He said that these pieces come from the weathering horizon (9 in our figure 7) and differentiated them on the basis of their chocolate-brown patina from the unpatinated flints of the gravels themselves. The instruments, much broken and eroded, he compared with the famous eoliths of Thenay, but he noted that human effort was more obvious in the Mesvin pieces. Neyrinckx's material came also from the south talus of the first 250 meters of the east part of the Spiennes trench and, here, the pieces are clearly stratigraphically prior to the other Paleolithic finds. On formal grounds alone, Delvaux assigned them to a period before any other Paleolithic finds previously (as of 1885) made in Belgium. This paper provoked a long and involved controversy. Delvaux illustrated some quite clear examples of "Clactonian"

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1 Delvaux 1885.

cores, resembling crude hand axes, together with some scrapers and borers but, unfortunately, he also chose some naturally fractured flints to round out the selection.

In 1891, to further substantiate his claims to the Mesvinian, Delvaux republished a version[1] of the Mesvin section which differs but slightly from the more general versions of Cornet, Briart and Houzeau. It was not until 1927 that the sections were again carefully reconsidered, this time by F. L. Cornet's son, Jules.[2] He republished the western section of the Mesvin trench without modification. He does note, however, that the little gravel lying on top of the reddened layer of Landenian is 10 meters above the alluvium of the Rivière de Nouvelles and calls it a terrace. The eastern part of the cutting, too, is reproduced from the research of 1867 substantially intact.

Cornet fils discusses the height of the base gravels of the loess and again makes terrace assumptions. He discusses and reprints without comment the earlier version of his father's drawing of the Spiennes trench and notes that the Spiennes and Mesvin trench were both refaced in 1914 and again in 1925-26. He revisited the cuttings and found that nothing really new could be added to the drawings made by his father in 1867. Rutot made a new drawing of the Spiennes part of the trench in 1914, but it was not published until included in Breuil's work of 1934.

Breuil[3], outlining the characteristics of the Clactonian technique, thought that the formations at

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[1] Delvaux 1891; also Service Géologique dossier 151, no. 44.

[2] Cornet 1927.

[3] Breuil 1932.

Spiennes-Mesvin represented terrace deposits corresponding to the high and middle terrace of St. Acheul, sloping from 65-30 meters in height above datum. A lower terrace to which the Carrière Hélin allegedly belonged was supposed to be located between 10 and 15 meters. The gravels of the Spiennes and Mesvin trenches were ascribed to the middle terraces, though Cornet (1927) had quite clearly assigned them to his Monastirian (lower) terrace of 18-20 meters. The gravels, in fact, range from 10-18 meters above the surface of modern watercourses nearby. We have maintained that this terrace argument is not acceptable through general considerations on the formation of the entire Haine basin.

Breuil also tells us that Rutot saw the recutting of the Spiennes-Mesvin trenches and noted that the base gravels were stratified and contained a very rolled industry, which Breuil here classifies as Clactonian II together with a less rolled Acheulian. The whole rested on the Landenian of which erosion removed a part. Later, gravel was deposited which contained Levalloisian in place and was covered, in turn, by three intact loesses. Breuil defined the oldest industry as one with non-prepared striking platforms, wide and often oblique, with a large bulb and strong undulations in the fracture plane. He described the implements as often oval or thick blades accompanied by rare, crude bifaces which are more nearly nuclei than true bifaces. In his opinion, they are soliflucted from higher terraces at Spiennes. The industry is alleged to be identical in both morphology and in geological position with that of Barnfield Pit and that of the

30-meter terrace of St. Acheul. A second series of a similar type is also sorted out on the basis of a lesser degree of rolling and is mixed with the Acheulian bifaces of the base gravels and seems more recent to Breuil.

In fact, there is no basis for equating the geological situation of the Spiennes-Mesvin trenches with those of Barnfield Pit or the 30-meter terrace at St. Acheul. Since the pieces in question are undoubtedly rolled--both the Acheulian and the Clactonian--it seems unreasonable to try and use the layers in which they are found to do any more than ascribe a terminus ad quem.

When Breuil and Koslowski reconsidered these sites in greater detail[1], Breuil was able to publish a tracing of the section of what appears to be the south face of the Spiennes trench made by Rutot in 1914. He also republished Delvaux's section of 1891 for the Mesvin trench with a modified interpretation of the significance of various layers.

Rutot's 1914 section, as presented by Breuil, differs somewhat from the publications of earlier years. In the drawing published, it appears to be highly schematic and not carefully recorded. It is important to note, in comparing the various versions, that Rutot seems to have figured the south side of the trench while the early publication figures the north side. The trench is fairly wide and any slight discrepancies may be due to variation in the actual layers over that small horizontal distance. One thing, however, is quite clear and that is: in the original publication, the authors do not show three superimposed stratified gravels under the main gravels of the loess, as does Rutot. In fact,

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[1] Breuil and Koslowski 1934.

they show only a single gravel (later two gravels in J. Cornet's 1927 version) below the main gravel of the loess followed by a stratified yellow and green sand in pockets on the Landenian in place. Breuil makes no attempt to differentiate the implements found in the Spiennes section from those found in either the east or west part of the Mesvin section and, does not seem to know from which of the two Mesvin sections Delvaux's original was drawn. As we have already pointed out, this latter section is taken in a small part of the east trench at Mesvin and is only partly characteristic of the whole.

All observers have noted the old soil layer immediately beneath the base gravel of the loess in the Spiennes section. The attribution of the "Mesvinian" pieces, together with the Acheulian material, to this layer rests solely on the testimony of Delvaux, though there is no reason to dispute it. It seems unlikely that the presence of the disturbed and weathered Landenian is due to solifluction, as Breuil thinks[1]. Examination of the western half of the section, together with the eastern half as published by Cornet, shows quite clearly that we have to deal with a riverine filling in the upper part of the Mesvin hill--a filling which is visible not only in the Mesvin trench but also in the Mesvin-Ciply quarries which are to be discussed. Breuil seems wrong, too, in attributing the sands to a period of solifluction which destroyed the gravels of the supposed terrace. The formation of the humus layer on top certainly comes at the end of the infilling phase. The industry in the sands is certainly not in place and, if Breuil wishes to ascribe

[1]Breuil 1934.

them to a group of gravels destroyed during an unspecified "first" period of erosion and solifluction, there is little with which to counter the argument though the question can hardly be considered as firmly settled. The bones in this layer are said not to have been rolled and are supposed to indicate a cold climatic phase for the sands in question. The humus layer is taken by Breuil, in any case, to indicate the interglacial.

We can agree that the gravels at the base of the loess containing implements which we recognize as Mousterian of Acheulian tradition--Levallois V--are of the beginning of Wurm. But we cannot agree with Breuil that the Riss glaciation is responsible for the alleged erosion and solifluction producing the sands beneath. There is nothing in the section to indicate anything prior to the last interglacial. There is no reason to assume that the disturbed Landenian represents any more than a humid episode in the last interglacial, a situation analogous to that which has been described at the Carrière Hélin. The implements from the Spiennes-Mesvin trench lower layers are admittedly rolled though that does not automatically imply that the layer is attributable to Riss time.

Breuil further comments[1] that the mechanical action of the watercourses in the area has been noticeably increased by tectonic movement since the beginning of the Riss glaciation. We have already discussed this in great detail and have stated that it is difficult to decide just when these tectonic movements took place and precisely what influence they had on the formation of various

[1] Breuil 1934.

deposits. It seems more likely that they occurred at some time during the interglacial.

Breuil has attributed the Spiennes-Mesvin deposits to a third terrace in the Haine valley (30-40 meters) and those of the quarries at St. Sympnorien, Spiennes and Mesvin-Ciply to a lower (10-5) terrace. Cornet[1] and Rutot[2] equate them all with a supposed 18-20 meter terrace. As Cornet himself shows, the difference in altitude, measured to the height of the nearest watercourse, is 10 meters in the case of the western edge of the Mesvin trench and reaches as much as 27 meters in the case of the eastern edge of the Spiennes trench. That contradiction alone shows some of the perils in evaluating the deposits here upon altimetric considerations.

Finds: In the gravels of the base of the younger loess (fig. 8) there are a series of instruments in place--unrolled, mostly unpatinated, in the black flint of the Spiennes chalk. Levallois technique (nos. 3, 4 and 6) predominates with large scrapers (no. 8), points (nos. 7 and 9), triangular (no. 1) and ovate (no. 5) bifaces which are typical of the Mousterian of Acheulian tradition usually found in this stratigraphic position. Included, however, are several elongated bifaces (no. 2) of a Micoquian character. Although this is not utterly unknown in deposits of this type, Breuil suspects that they are not quite as late as the other Levallois V deposits at Hélin, Mesvin-Ciply and elsewhere in the region. The Micoquian bifaces which the writer has seen are rolled and patinated differently, however.

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[1] Cornet 1927.

[2] Rutot 1919.

A group of 5 bifaces from Spiennes and 23 from Mesvin, which Breuil classifies as Acheulian IV (fig. 9) are distinguished coming from the weathering of the sands below the base of the loess. They are chipped, with large flakes on both faces, and there are few small retouches along the edges which characterize the Levallois V class of biface. He distinguishes several forms, among which are the lanceolate, with a thick butt and thin point, said to be typical of Acheulian IV (no. 10); massive pieces of similar character; pointed ovoids (no. 8); small heart-shaped bifaces (no. 9) not as well-finished as in the Levallois V--all found with series of flake tools with unprepared striking platforms (nos. 11, 12, 13, 14). Breuil admits that this small tool assemblage has much in common with the Clactonian from the same layer, but he claims that the technique of retouch is different and that they are much larger, more regular and the presence of dulled-back scrapers (no. 6) causes him to compare them with the industry observed at Montières by Commont and that visible in the middle level of Barnfield Pit at Swanscombe. He thought that the Acheulian implements are less rolled than are the Clactonian pieces from the same layer.

Examination of the material in the Musée d'Histoire Naturelle leaves the writer with some doubts about the separation of the two series, if indeed such a separation exists. In patina, all the pieces are chocolate-brown to greenish in color, probably acquired from the sands in which they lay. Distinctions based on the degree of rolling, employed by Breuil, seem

largely arbitrary. That there is another industry mixed with the middle Acheulian pieces might be claimed from the presence of some big "Clactonian" cores, none of which are figured by Breuil, though there are several examples (no. 4) in the various museums. These are nearly identical with their counterparts in England. This "Clactonian" is probably a workshop aspect of the confection of the Acheulian bifaces and the "Clactonian" cores are no more than unfinished bifaces therefore.

The "Clactonian" industry in question (nos. 1-5) is that first identified by Delvaux in 1885, based upon the collection of Neyrinckx, to which the famous term "Mesvinian" was applied--a term which has also been applied confusingly to crude Levallois flakes of the base gravels at the Carrière Hélin.(see page 58). Breuil sorts out the large flakes, which are more or less ovoid in shape, or the thick blades as characteristic of this series. A large convex bulb of percussion and a fracture plane with large undulations is also thought typical together with absolute lack of a prepared striking platform--in short, a definition of a typical "Clactonian" flake. Breuil thinks that the large blocks which are partially chipped served as nuclei rather than unfinished hand axes. He admits that bifaces accompany the flakes but thinks that they come by way of "adaptation of nuclei through regularization of the edges". We think that the entire deposit may also be a middle Acheulian one in which the Clactonian is but the flake component. The implements are not in place and the geology of the site, apart from furnishing us with an upper limit of the

last interglacial, gives no precise idea as to their exact age.

De Heinzelin distinguished a biface component of what he chooses to call "Mesvinian, type Delvaux", as distinct from "Mesvinian, type Breuil" of the base gravels at Hélin[1]. Among the flakes at Mesvin, De Heinzelin distinguished some which he equates with flakes from the base gravels at Hélin.

De Heinzelin interprets the cutting presented originally by Cornet as showing a single gravel at the most, with a sandy facies; the "Clactonian" flakes and the hand axes are found together in them. The only argument which he thinks might serve to separate the pieces is the absence of bifaces in the base gravels at Hélin, where flakes are found analogous to those of the Mesvin trench. But this, as he correctly points out, is hardly a positive argument. His arguments against the separation of the bifaces from the flakes (with which we are in agreement) are: the identity of patina and wear; and, more strongly, the connections visible between the flake technique and the manufacture of hand axes. On this second count, he views the manufacture of a biface as passing through several steps. The first of these is the striking of thick flakes with a large bulb, giving rise to the Clactonian flake and core.. Then come thick flake blanks which are reworked on one face but not on the butt. Following these are the thick flakes retouched on a whole face and on the butt; finally, the bifaces are (next page)

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[1] De Heinzelin 1949.

produced. In any case, it seems from De Heinzelin's analysis that he considers the sands associated with the base gravels at Spiennes and Mesvin, and the old soil built upon them, to be older than the fluvial sands and old soil at Hélin.

4) The St. Symphorien Group of Quarries

History of the Sites: A series of quarries, known under the names of the various firms[1] which exploited the environs of St. Symphorien, are spread out along a nearly straight line which stretches from the cross-roads at the entrance to the Anglo-German military cemetery south of the village northwest to the Bois d'Havré for a distance of about two and a half kilometers (see map, fig. 1, no. 3). They follow an outcropping of deposits of phosphate-rich brown chalk. The quarries were opened during the phosphate "rush" of the 80's and 90's of the last century and they were worked intensively in the years which followed until the pockets of rich phosphate were exhausted or until cheaper and more effective fertilizing agents from abroad forced them to close down through pressure of competition. Work was briefly resumed during the second World War, though activity was not concentrated in this part of the deposit. At present, the area is a scene of abandoned factories, their crumbling walls being robbed for other construction; vast decantation basins, now stagnant and weed-filled; enormous cuttings and galleries, partly collapsed and overgrown with coarse underbrush and saplings.

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[1] Among others: Hardenpont, S.A. Phosphates de Bois d'Havré, Houzeau, Pluto-Phosphates de Havré St. Symphorien, Galeslout, Suri, Pivot Martin, S.A. de St. Symphorien; we do not think it worthwhile to plot these separately. The relevant points (nos. 7,8,9,10,11,11a,13,14,17,18,19,20,33, etc. of Dossier 151, Service Géologique de Belgique) can be seen on the unpublished map in those archives, or in the archives of the MHN (map 45/8).

Faunal remains (Elep. Primi) from the Havré-St. Symphorien area are noted before the advent of the feverish quarrying activity of the 1880's by Cornet, Briart and Houzeau in their classic report[1] on the Quaternary in the Haine Valley for the Prehistoric Congress of that year. The bones come from excavations made during the construction of the railway station of Havré, some two kilometers northeast of the St. Symphorien quarries. We know nothing about the find but the bare fact and that they occur in gravels 12 meters above the modern river; however, it can be inferred from descriptions that these gravels are at the base of a sandy facies of the younger loess.

Nearby, and probably in a similar stratigraphic position, finds of Paleolithic flints together with a molar of Elep. Primi. are reported by the same authors; these were in the excavated earth from the trench at la Garenne (fig.1, no. 33) on the paved road from Havré to Boussoit, not far away from the first find. Just what these flints were and exactly in what circumstances they were found is again unknown.

It was, however, with the opening of the phosphate quarries themselves that finds began to come in large quantities and attracted wide attention. De Munck[2] and Mourlon[3] were among the first to study the sections. A complication introduced for the first time in Pleistocene sections in the Haine valley was raised by a peculiar layer of windblown sand which overlay the usual sequence of deposits (fig. 10, right). This

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[1] Cornet 1872.

[2] De Munck 1890.

[3] Mourlon 1889 and Dossier 151, Service Géologique de Bruxelles.

eolian sand, now known as the sand of Obourg after the commune to the north where it is best developed, forms a series of dunes along the road from Mons to Roeulx and covers wide areas of the communes of Havré, St. Denis, Obourg and St. Symphorien. The sands were initially Tertiary in origin, coming from the hills on the northern and western sides of the region, but the finer particles were lifted by the wind and deposited in a layer above the loess.

The Section Today: In a northern portion of the profile, where Landenian in place is visible at the bottom of the cutting (fig. 10, right), we observed that the upper soil profile was quite complex. This soil was formed on dry disturbed sands beneath. Yellow sands with clayey patches and bits of chalk throughout extend beneath this complex and below them comes a faint gravel which, in its turn, rests upon reddish-brown loess. In turn, the gravels rest upon a deposit of green sand, with red spots on the green ground of the base sands. These green sands are current-bedded and rest upon the blackish Landenian which has been observed by other authors.

To the south (figure 10, left), the humus is formed on brick earth giving way to loess below. This loess is set off by a thin gravel from a sandy loess which, in turn, lies upon a heavier gravel. This gravel rests on yellow clayey sands lying above a weathering horizon formed on criss-cross stratified green sands, the disturbed portion of normal Landenian below.

It can be seen from this that the sandy facies of the Pleistocene deposit become more pronounced as one moves northwards. The only layer which seems clear is the

weathering of the fluvial green sands in the middle of the southern part of the cutting. Taking this as caused by a warm period with little erosion, we deduce that the current bedded green sands below are probably interglacial. We think that the sandy loesses above, together with the gravels and various fluvial sands, are valley deposits formed during phases of infilling and erosion of the surrounding hills. This might be correlated with periods of increased rainfall but the climate need not necessarily have been fully glacial. The entire complex in the bottom of the valley may conceivably be out of synchronism with the higher deposits by a fraction of a climate cycle and that would account for the somewhat later aspect of the implements found in layers paired with up-slope deposits. The exact relationship requires further study and cuttings to connect the sequences.

The Finds: In 1891, De Munck[1] illustrated an ovate hand axe which he says was found in an unspecified exploitation in the Champs Elysées (fig. 11, no. 5). The Champs Elysées are located between the Bois d'Havré and the hamlet of Cernaut and possibly therefore part of the Hardenpont or one of the other quarries touched them. The hand axe is clearly stated to be from the base gravel of the younger loess. There is little question of its identity with figure 13, no. 3, in Breuil's study[2], in which he erroneously says that the implement must come from the green sands.

Commont[3] showed quite conclusively the error which Rutot[4] committed in equating the loess base gravels

[1] De Munck 1891.

[2] Breuil 1934.

[3] Commont 1912.

[4] Rutot 1901.

with the end of the first phase of advance of the Gunz glaciation and, in dealing with the general problem of deposits low in the valley, he attributed the sands and what went with them to the upper Quaternary. Though other theories can be offered to fix the dates of these deposits, there can be no disagreement with Commont's general conclusions. He further described the sandy loess as being a facies which has been observed elsewhere when in contact with islands of Tertiary sand. The deposit, he concludes, is of the same age as the calcareous loess (Wurm II and III) visible in the Carrière Hélin nearby and, hence, the base gravels should in theory correspond to the base gravels visible in that quarry. At Hardenpont, the slope of the ground is so slight that it is difficult to imagine solifluction at any time in the recent past and this may account for the sparseness of the gravel at the base of the loess. It is rarely more than a few centimeters thick.

By the early 1930's, though a considerable body of literature[1] had been built up concerning these quarries, there was still no serious attempt to study the implements contained in the deposits. In 1934, Breuil published his survey of the Paleolithic material in the Haine valley and devoted a considerable section to what he called the St. Symphorien quarry. He was referring specifically to the Hardenpont section and republished a cutting recorded by Rutot (the version of 1901-1902). He views the ensemble of quarries as situated on the lowest terrace of the Haine.

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[1] Apart from those already cited:
De Munck 1890; Cornet 1927; Rutot 1892; Ladrière 1892.

To interpret the cutting, Breuil has reference to the previously-discussed Carrière Hélin. He did no field work in the sections himself as far as we can determine from eyewitnesses to his visit to the region. The upper loess with its base gravel is assigned broadly to the Wurm glaciation with solifluction at its beginning. The sandy loess of Hardenpont is equated with both the loesses of Hélin. The green sandy layers at the two quarries are equated and, on that basis, the Hardenpont green sands are assigned to the last interglacial.

Breuil believes that some of the Paleolithic finds were made at the upper limit of the green sands and the base gravel of the loess. Though Rutot reported them from the gravels, Breuil does not think this exact. All other sources reported so, too, some quite independently of Rutot. This attribution to the upper part of the green sands appears to be based upon patina. Breuil, using the cutting of 1902, is unaware of the pockets of yellow sand between the green sands and the base gravel of the loess (fig. 10, left) and does not take advantage of the explanation they might offer for the fact that some of the flints (allegedly coming from the green sands) have a brilliant lustre while others, supposedly coming from the gravel, are white and only slightly lustred. Breuil supposed that, during the formation of the thin base gravels of the loess, the upper part of the green sands were partially destroyed by erosion and solifluction and that the worked flints contained therein were exposed to the air and particularly to blown sand-polishing and, later, to frost which cracked many of them. The explanation seems not inapplicable at

first glance. It is not unreasonable to agree with Breuil's hypothetis that some erosion was carried down into the green sands through the sandy eluviation horizon, displacing the implements from whatever layer they might have rested in previously. The fact that there are no signs of rolling on some of the instruments concerned leads us to believe that the erosion was not accompanied by solifluction. The rolled material from the quarry which Breuil attributes to a middle Acheulian deposit may have been transported during the deposit of the upper layers of the current bedded green sands.

In any case, Breuil sees two classes of objects in the finds of the various quarries: one group--rolled, lustred and often broken--belonging to middle Acheulian times; the other--unrolled, very lustrous, with some Micoquian-type bifaces--belonging to his Levalloisian IV.

The middle Acheulian pieces (fig. 11) are confined to bifaces with rolled and worn edges at the MHN.[1] We can agree that they do appear older and cruder than the bulk of the assemblage. No attempt to differentiate them is made in the exhibited material.

The material which Breuil calls Levallois IV (fig. 12) consists of numerous discoidal nuclei (nos. 8, 9); Levallois flakes (no. 10), smaller in size on the average than those from Hélin; Levallois points and scrapers (nos. 4-7), carefully retouched and resembling, says Breuil, implements of true late Mousterian type. Suppression of the bulb of percussion is occasionally encountered. Retouched blades are numerous and Breuil thinks that they resemble those of his third archaeological

[1] Musée d'Histoire Naturelle (Brussels).

level in the Hélin material. In general, the implements from the loess gravels (fig. 13) present a close analogy with those of the Carrière Hélin in that they contain an identical series of flakes (no. 5), blades and scrapers (nos. 6, 8 and 11) and points (nos. 4, 9, 10, 12, 13).

De Heinzelin in 1949 recorded part of the assemblage as upper Acheulian; though there is little doubt that the bulk of the pieces are of this nature, there are also many signs of a later, perhaps Wurm, interstadial facies in the almost typical Mousterian implements found (fig. 13) along with the older material, to say nothing of possible upper Paleolithic pieces (fig. 12, 1-3). The stratification of the quarries is ambiguous and the equation of the current bedded green sands with the upper fluvial green sands at Hélin, though strongly intimated by the continuity of such sands in intervening cuttings such as those of Houzeau, fils, is not definite. Hence, the geological position of the green sands is a bit unclear. We cannot say for certain that loess gravels do not represent a mixture of the base gravels of the younger loess II and perhaps I in spots. Since the position of the implements does not guide us in interpreting the geological layers and the geological layers seem ambiguous in several senses, the entire deposit seems unreliable as a source of strict chronological or cultural conclusions.

Some of the implements correspond quite well with the upper Acheulian types with a white patina observed by Bordes at Tillet[1], and that group seems the

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[1] Bordes 1954.

clearest set in the assemblage. Unfortunately for the interpretation of the Hardenpont green sands and their rolled implements, the Tillet assemblage seems to come quite clearly from the base of a Rissian loess. These sands containing rolled Acheulian, overlain perhaps by sandy pockets, must therefore be at least later than Riss, an obvious and not very satisfying lower limit.

5) The Solvay Quarries of Mesvin: The Bernard Quarries at Spiennes

History of the Sites: The outcrop of rich, phosphated brown chalk arcs westward after passing almost due south-west of Spiennes. A whole series of exploitations of this deposit were opened during the 1890's by various companies, many of which eventually became part of the Solvay combine. The quarries follow the geological formation, and there are a whole series abandoned along both sides of the little dirt road which joins Nouvelles with the site of the 12th century monastery of Belian at Mesvin. At two of these (one in Cadastral parcel 328 of Mesvin and the other in parcel 296 to the south) Paleolithic finds and Quaternary sections of some importance have been recorded.

F. L. Cornet published the first section, together with information on finds of Paleolithic flints[1]. The hill between the By and the Rivière de Nouvelles is underlain by an extremely rich phosphate deposit and, in the early 80's of the last century, the Solvay company, Leopold Bernard and the Société de Mesvin-Ciply

[1] Cornet 1884.

opened a series of cuttings. The Société de Mesvin-Ciply had one of its works in Cadastral parcel 328 of Mesvin. In this cutting, Cornet reports[1] finding a white patinated "Acheulian" hand axe, 14 x 8 x 3 cm. and quite lustrous, which he attributes to exposure to the elements; he informs us that the tool was found 5.50 meters below the 63 meter contour in a layer of sandy silt and gravel in contact with the Landenian (Eocene). Unfortunately, he does not illustrate the find, but Delvaux does so shortly afterwards[2]. It is a pointed biface which looks like a very late Acheulian type.

In the year 1884, Delvaux was leading a group from the Société Anthropologique de Bruxelles during an excursion in the immediate vicinity and, in lieu of visiting the Mesvin trench, they paid a visit to several of the Solvay quarries (fig. 1, no. 4). Delvaux tells us that this was the same deposit in which Cornet made the discovery discussed above. It was, he said in the filling of a river bed cut prior to the deposit of the lower loess, and the upper loess is, in its turn, deposited above. The brick earth then follows with humus on top. Delvaux's group then moved some hundreds of meters south where, according to Lemmonier (the engineer of the quarries) other "Acheulian" flints were found. Delvaux obligingly provided the group with a map of the itinerary, reproduced in the reference cited, and this fixes the position of the various finds and sites. His drawing of the section is still the best available. Ladriere[3], during his survey of the material

[1]Cornet 1884.

[2]Delvaux 1885.

[3]Ladrière 1892.

from the Mons valley, also visited the site and he redrew the section originally published in 1885 by Delvaux.

Rutot[1] reported the discovery of two "poignards", allegedly reworked in the Neolithic, which came into the MHN collections by way of Dethise (see section 9). They supposedly came from the fields between Mesvin and Nouvelles where the debris from the phosphate workings from the Solvay and Bernard quarries were dumped and where Lemmonier found his pieces. The writer's examination in the MHN showed that they belong to the category of the several tons of pieces fabricated by Dethise for the gullible Rutot.

The Sections: The sections of parcel 296 and 328 being no longer visible, we must use the reports of Delvaux[2] (fig. 14), and Cornet[3]. Lying well under the lower loess comes the gravel which contains fragments of chalk and flint and the numerous bones of the cold fauna noted before together with the "Acheulian" flints. At the same point Delvaux and Lemmonier had reported finding a molar of Elephas antiquus in 1891, but J. Cornet and others dispute the attribution. The writer has been unable to trace the find.

On the left side of the cutting in parcel 296, directly under the upper loess, came a weathered deposit of Landenian, quite loose and yellowed. Beneath it came the normal Landenian which, here, was cemented by a hydrated silica into a deposit known locally as the Landenian tuffa. A_t its base were found large blocks of flint with a green surface and some rolled pebbles.

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[1]Rutot 1902.
[2]Delvaux 1885.
[3]Cornet 1927.

The weathered sands, according to the original report of Delvaux, contained broken "Mesvinian" flints comparable to those found in the eastern part of the Mesvin trench. Actually, the material seems to correspond to the upper Acheulian flake implements which have been noted in other deposits in the area.

J. Cornet notes that the lower loess fills the bed of an old watercourse which was 40 meters wide and 9.50 meters deep--at least 14.50 meters above the surface of the modern alluvium of the By, a kilometer away. The same watercourse was seen in the quarry to the south (that of parcel 328 which F. L. Cornet had described)--here having its gravel bed 16.50 meters above the surface of the By. J. Cornet thinks that the thalweg terminates between the two sections of the Mesvin trench. His conclusions, based upon altimetric considerations and viewing the gravels as terrace deposits, are not strictly tenable. There are still strong indications in the present relief that similar thalwegs following the north-south course across the hill of Mesvin-Nouvelles were established at even later dates and now remain as numerous dry valleys. These features are easily visible in the air photographs. There seems to be little basis for thinking that the thalwegs visible in the modern erosional relief are very different in character or formation.

Breuil and Koslowski[1] reconsidered the material in the various collections and republished an interpretation of the cutting of Delvaux. The cutting is analysed by them as follows: the profile is part of an old river bed completely filled in, cutting through the Tertiary and

[1]Breuil and Koslowski 1934.

down into the Secondary. The Quaternary, for them, begins with the base gravels of the loess. They believe it is composed of a part of old disturbed terrace gravels and solifluction debris, the whole formed before the deposit of the recent loess. The lower younger loess is quite stratified above it and is distinguished from the younger recent loess by the difference in appearance. Breuil believes that the weathering and disturbance of the Landenian sands on the left side of the cutting is due to the period of erosion and solifluction accompanying the Riss glaciation, and the soil slip layer of weathered Landenian visible under the inclined gravels is attributed to solifluction at the beginning of the Wurm glaciation.

The theory that disturbance of the Landenian is due to the Riss glaciation remains entirely hypothetical and unsubstantiated. However, the weathering is not a glacial effect; nor need the hill wash layer which lies between the weathered Landenian and the gravels of the base of the loess be due to solifluction but may just as well be merely local in character. Breuil's interpretation of both these layers as caused by cold phases is not well-founded. The channel of the old stream may have been scoured out at any time--cold or warm, wet or dry. However, the version of the cutting published by Cornet of the same thalweg, though a bit further away, clarifies the question considerably. Here the intercalation of a soil slip or hill wash layer between the first and second loess clearly serves to indicate a wet phase, probably that at the end of the Wurm 2/3 interstadial. Similarly, the slip layer between

the lower loess and the weathered Landenian may indicate the wet phase at the beginning of Wurm 2. The base gravels are visible in this cutting only at the bottom of the thalweg and not at their sides, and they must be purely fluvial in origin here--hence, of early Wurm 2 date at the oldest, though further and more exact specification is not possible. The weathering of the Landenian, assuming the destruction of Wurm 1 and Wurm 1/2 interstadial deposits and weathering, seems likely to be interglacial and the hill wash a deposit of the interglacially-weathered material. Hence, the disturbed Landenian in place is attributed to the interglacial. Thus, the thalweg itself is predominantly Wurm 1 and 2 in origin though it may have persisted up to the Wurm 2/3 interstadial.

The Finds--Mesvin-Ciply: The flints which come from these quarries, apart from the "Mesvinian" claimed by Delvaux which the writer could not find in the museum reserves, fall into two classes in Breuil's scheme with which we here agree. He distinguishes them on the basis of rolled and unrolled material[1]. They all come from the gravels at the base of the loess in both cuttings. The first group, the rolled material (fig. 15, nos. 8-10), is attributed to Acheulian III and are principally almond-shaped bifaces, though a lanceolate form is also noted. The material is paired with that of Cuesmes and Elouges on a typological basis. Unfortunately, the material from the latter places is represented by a single biface from the Rolland quarry (fig. 24, no. 6) and by questionable surface finds from Elouges. That the

[1] Breuil 1934.

Solvay pieces are middle Acheulian is not contested. It is not unlikely that these pieces are pre-Rissian in date and, hence, may well have been rolled more than once before they came to rest in their present position.

The other group from the base gravels of the loess and the thalweg belongs to Breuil's Levallois V, consisting of discoidal nuclei, numerous Levallois flakes (fig. 15, nos. 1, 3, 4), triangular points, scrapers with suppressed bulb (fig. 15, no. 5), heart-shaped and triangular bifaces (fig. 15, nos. 6 and 7) made on big Levallois flakes--some of them extremely regular. There seems to be no element of mixture in the deposit and no traces of rolling on the pieces themselves and, therefore, we accept the classification and dating of the pieces assigned by Breuil to the beginning of the Wurm glaciation. The types are Mousterian of Acheulian tradition with a high proportion of Levallois flakes. De Heinzelin makes the same attribution[1]. In the display of material from the quarry in the MHN, it must be noted that the quarry of parcel 328 is shown in section but that the material in the collection also comes from parcel 296 and a number of other sites.

6) The Carrière Bernard at Spiennes; the Solvay Quarries

At Spiennes

Our only record of the Bernard quarry comes from Delvaux[2]. He mentions that, during an excursion of the Société Anthropologique de Bruxelles, they visited quarries which were then in full operation on the right bank of the Trouille (fig. 1, no. 5) and that a section was

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[1] De Heinzelin 1949.

[2] Delvaux 1885, Service Géologique Dossier 151, no. 28.

visible along the little spur railroad which served the quarries. This section contained very few terms--disturbed loess, gravel, green sands, weathered green sands, phosphated chalk. The finds in the MHN (fig. 16) are not very numerous, but they are worth some discussion.

Some of the material in the MHN from the Solvay quarries at Spiennes comes from the collection of Alfred Lemmonier (fig. 16, nos. 6 and 7). The Bernard-Spiennes pieces we reproduce (fig. 16, nos. 1-4) are clearly labelled in one form or another to indicate their origin. They form a sufficiently homogeneous group on the basis of patina, type and wear. The types are those of the Mousterian of Acheulian tradition--small ovates, big Levallois cores (fig. 16, no. 4) and flakes (nos. 1-3).

As we have noted elsewhere, the Pleistocene deposits on the right bank of the Trouille are not conspicuously thick. Of the objects coming from the Bernard-Spiennes quarries, most have a white chalk patina, indicating that they probably rested quite near the eroded surface of the Cretaceous, perhaps in pockets of altered Tertiary sands. The Solvay-Spiennes pieces may come from any one of four quarries and, in the absence of exact provenance information, little can be said beyond a superficial presentation of the finds (fig. 16, nos. 5-7). They appear to be late Acheulian in character.

7) The Ciply Quarries

The quarries occupying the slope of the hill between the Mons-Mabeuge road and those near the Roman road, the old St. Gobain and Bernard workings of Ciply, have been known more recently under the name of Andrée (fig. 1, no. 6) and are now worked by a number of small

companies. Present activity is restricted to the washing of the old tip heaps for phosphates though some chalk is mined as well. The cutting of the old exploitation belonging to E. Andrée was examined in 1947 by De Heinzelin and the writer found the notes in the archives of the MHN, confirming observations he himself had made on the spot in 1956. Priority must be accorded to De Heinzelin for these cuttings.

Here, too, (fig. 17) as in the cuttings of the Rivière de Mesvin, a depression in the base chalk is indicated even on the surface and the infilling is a rather interesting deposit. Under the arable soil which is built upon the brick earth, there is a distinctly reddened layer of the yellow loess beneath. In this layer, De Heinzelin found some flint wasters which he believes to be an upper Paleolithic industry. The flints (in the reserves of the MHN) do not permit one to determine its type. Beneath the yellow loess, there is a hardened layer representing the top of a loess with spots of chalk and, beneath that, the loess itself. It rests on a gravel which is mixed with weathered Landenian sand, reddish in color, and De Heinzelin believes that he found a tibia of Ursus in this layer, indicating that the weathering is Quaternary in date. The Maastrichtian tuffa lies beneath the section and is cut by a channel filled by the other deposits. It is not possible to determine the dating of this channel other than to say that it is before or during the last interglacial. The reddening of the Landenian which we have encountered elsewhere is probably interglacial. Exactly to which climatic phase the atypical upper Paleolithic industry

corresponds is difficult to judge from its position immediately below the brick earth. We have seen no identical paleosoil in an analogous position anywhere in the Mons valley. The upper paleosoil at the Carrière Hélin lies under a deep and complex deposit of loess, has no recorded industry and seems to be pre-Wurm III in date. It would be useful to have more data on the Ciply upper Paleolithic industry, for, together with the material from Obourg-St. Macaire, it is the only upper Paleolithic material in the whole valley which has been found in geological context. The other find from these quarries (fig. 30, no. 1) is not accompanied by data concerning the circumstances of discovery.

8) Miscellaneous Sites

The Paleolithic population of the Mons valley did not confine itself, for the convenience of archaeologists, to the limit of the phosphated chalk and the area cut by the 19th-century railroad trenches. There is considerable evidence that this occupation scattered over the entire region though the concentration tends, for the most part, to follow the chalk with its flint-bearing seams (see fig. 1). Many of the sites are known to us only through casual notes in the hundred-year-old literature and are no longer to be found. Others are known only through a few objects in various museums and collections where provenance is stated without further information. Some objects are surface finds made by the writer during the survey of t he region. Almost all are without geological context and, hence, any attempt at classification must remain tentative.

8 (1) Chemin de Mesvin

History of the Site: Crossing the Trouille on the small bridge which connects Petit Spiennes on the left bnak with Spiennes itself on the right, turning first right and then left for a distance of about 200 meters, one comes upon a small dirt road (map, fig. 1, no. 7) leading upwards at a steep angle in the high left bank. This road emerges a few hundred meters further onto the high part of the cuesta through which the Tranchée de Spiennes was cut in 1867; it leads eventually to Mesvin, the adjacent commune some several kilometers westwards. The road is known as the Chemin de Mesvin. Because of the steepness of the river bank and the mobility of the soil, a very deep hollow way has been formed, providing a natural section.

The first indication that Paleolithic implements occur at all in the Spiennes area or, in fact, almost anywhere in the Haine valley comes, curiously enough, from this little-known site. In a sense, it has been overshadowed by the impressive Tranchée de Spiennes, some half-a-kilometer further south but, before the latter was cut, the "Chemin Creux" of Mesvin-Spiennes gave one of the first sections of the loess and sand deposits on the left-bank hill and yielded one of the first implements definitely not Neolithic. C. Malaise[1], as we have noted previously, reported the finding of a "hache en amande" at the base of t he loess here.

The road has a very simple section, with brick earth developed on the uppermost of the younger loesses; a well-developed base gravel resting, in turn, on

[1] Malaise 1866.

weathered Landenian Tertiary sand--the whole reposing on the weathered surface of the Cretaceous chalk[1]. The flint which Malaise found in place, judging from his drawing, looks like a rather ordinary late Acheulian or Mousterian of Acheulian-tradition type. Though the piece itself seems lost, a quite similar type said to be from this site is to be found in the MHN (fig. 18, no.6) which, though broken, can be used for comparison. It is well-rolled, bearing a brown patina, and looks middle or upper Acheulian. We cannot judge from Malaise's drawing if his flint was also rolled to the same degree as is this one but, in any event, flints of this type might be expected to show signs of rolling if found in a gravel belonging to the base of the younger loess III.

The finds from this site seem to have entered the MHN during or after 1910. Rutot inquired about them in 1922 and a charmingly-misspelled answer from Ch. Stevens, one of the local collectors at Spiennes, explains that the pieces were found in a talus 3 m. high in the road and that the material comes from the surface of a layer of green sand 20 cm. from the bottom of the road. De Heinzelin[2] is sceptical about the site but he is a bit too ready to imply that all finds were made during the 1914 re-facing of the Spiennes trench. But some of the pieces undoubtedly entered in 1910. We may assume, therefore, that the collection is at least in part of authentic provenance thoughit may have been "enriched" with pieces coming from elsewhere or fabricated. There is a postcard to Rutot in the archives[3] from Leon Debreux

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[1] See also Mourlon, Dossier 151, no. 22, Service Géologique- unpublished.

[2] In archival material.

[3] In HaMo 197.

of St. Symphorien, postmarked 21, Oct. 1910, explaining that Stevens had found the material at the point in question. We are quite certain that the Spiennes trench was well-overgrown in 1910. All references of visits to the area prior to 1914 and after 1885 speak of the impossibility of seeing anything there.

The Finds: Basically, the finds in the MHN can be divided on the basis of patina and wear into two or three distinct groups. The first and seemingly the youngest, showing only slight rolling, bear a black or dark gray patina (fig. 18, nos. 1-4). They appear to be a fairly standard Mousterian of indeterminate facies represented by a group of flakes with pronounced Levallois technique (especially no. 2), facetted butts and some tortoise cores or steep-sided scrapers on thick Levallois flakes. The second group (fig. 18, nos. 5-10), showing traces of very marked rolling reducing some pieces almost to formless pebbles, has a red-brown patina and contains a high proportion of crude bifaces looking largely middle Acheulian though some of them might conceivably be early Acheulian. Cortex often remains in spots and chipping is quite crude without any secondary or edge trimming. A subdivision of this group, or perhaps a separate group in itself, can be made by choosing some very crude Clactonian cores, also with brown patina, though these may conceivably be unfinished bifaces of the type observed above. They are accompanied by small flakes (fig. 18, nos. 7 and 8) with large bulbs and scars, also with brown patina--much-rolled, though the degree of rolling varies from piece to piece. They are more or less formless and probably are not implements. They may

be waster flakes from biface production. One or two bear signs of secondary trimming and retouch. A number of flakes in relatively unrolled condition, bearing a greenish patina and struck with a technique that almost approaches the Levallois, seem to fit in with none of the above groups either upon grounds of patina, technique or degree of rolling and may form a component of another culture in this very mixed gravel.

Geologically, of course, the site offers nothing very interesting. The erosion accompanying the last phase of the Wurm glaciation probably resulted in a solifluction deposit on this quite steep slope, a deposit which is surely also mixed with older river gravel debris from the Trouille--the whole forming a mass which cannot be differentiated. Here at the Chemin de Mesvin we have, although mixed and rolled, some of the periods represented in the Spiennes trench deposits 500 m. further south; it seems not unreasonable to suppose that they do, in fact, really belong to the same cultures as those represented in the richer deposit.

8 (2) "Ancien Houillier de Harmignies"

We are somewhat less than fortunate concerning the documentation of finds from the old workings on the summit of the cuesta which overlooks Harmignies. The site itself is not visible today. Several of the pieces are in fact marked in the Mons and Brussels museums and the point is well marked on the 1:20,000 map in the 1947 edition (fig. 1, no. 8). The finds in the MHN are a hodge-podge of Neolithic, Mesolithic and Mousterian pieces together with an enormous number of flakes of clearly recent fabrication, probably incorporated by the

vendor. The inventory numbers are varied enough and range over the several decades on either side of the turn of the century. Exploration of the site today reveals little in the surrounding fields but the Mesolithic and Neolithic material which would be expected. The genuine flints in the MHN collection (fig. 19, nos. 1-5) all have in common a heavy white chalk patina and include a number of broad Levallois flakes, though not so large as those encountered in the St. Symphorien quarries a few kilometers downhill. The butts are generally facetted and bifaces, when present, are small and crude (no. 1). There are no signs of rolling. Blades are not infrequent (no. 3). The site is today being slowly encroached upon by the edge of the enormous quarry belonging to the Cimentries de Harmignies and very shortly may be destroyed. The Pleistocene deposits are most complex and best-developed right near the Mons-Beaumont road at the extreme western edge of the cutting (pl. 1 and fig. 20). De Heinzelin recorded the cutting of the then "CCC" quarries in 1947[1] and the writer did so independently in 1956. There is some difference between the two records, but the writer's version seems somewhat more complete. at least if the number of terms is any indication.

De Heinzelin saw a sequence something like the following: Arable soil; brick earth; loess with some bits of chalk; coarse sand with lustred gravel, attributed to eolian action (noting that this gravel is well-formed only under the pockets of sand and otherwise is mixed with the bank of flint nodules below); homogeneous green sands; band of flint nodules, unrolled and

[1]Unpublished.

occasionally broken on the spots; coarse schistoid red sand; Spiennes chalk (Senonian with Trigonosemus).

The cutting as presented by De Heinzelin does not reflect the present position of the quarry and, ten years later, some other aspects developed. The cutting we present (fig. 20) taken close to the Mons-Beaumont road, is in effect a synthesis rather than a complete or exact picture, since the action of the mechanical excavators used has made it nearly impossible to see the cutting clearly over its entire length. The deposits are sufficiently uniform, however, so that correlations and contacts can be made safely. The homogeneity of the deposits is outstanding, but unusual features occur in a limited number of places.

The layers are inclined downwards towards the west at a slight angle, not exceeding five degrees. They follow, for the most part, the inclination of the chalk below in the extreme western edge of the quarry. Above lies the layer of humus which is uniform to a depth of about 25 cm. throughout the length of the cutting. It is formed for most of the section on brick earth which gradually inclines downwards to the west in an almost uniform band of 60 cm. thickness; about 100 meters from the road a series of secondary layers intercalate themselves between the brick earth and the humus. These layers gradually peter out as one moves eastwards and do not appear again throughout the remainder. They are composed of a yellow loess with spots of chalk directly under the humus. This is followed by a yellow loess without points of chalk and it, in turn, is followed by a horizon which, though not as brown as the brick earth,

seems to be of much the same nature, rather clayey and schistoid. We can say definitely that these layers are not caused by debris thrown up from the cutting of the road. That debris is visible under the humus directly near the road itself and is a clearly disturbed deposit. The other layers are too well-defined and clearly-stratified for any but a natural deposition. They represent a series of hill washes, perhaps with secondary reformation of a brick earth during the time of the initial formation of the main brick earth itself.[1]

Under the main brick earth comes the usual yellow loess with many bits of chalk, though it is somewhat less chalky in the upper portion near the brick earth. This corresponds with the observations of De Heinzelin. Under the loess, however, there is a clearly-defined old soil line, marked by a reddish-gray sand with black spots, only a few centimeters thick and occurring only in thin lenses between the upper yellow loess and the green sands observed by De Heinzelin and confirmed by the writer below. These green sands, too, occur in pockets and the weathering horizon is observable for the most part on the surface of these green sands only where they exist below. The green sand in spots takes on the aspect of a fine grayish loess, though this may be a purely local variation. Under the green sand come the pockets of flint nodules immersed in a very red schistoid sands. In spots, these sands can be seen for the most part to overlie the flints though, in general, the two are well-mixed. These red sands are formed on very rare patches of Landenian green sands which remain in pockets in the much weathered surface of the chalk, though

[1] The uniformity of the layers below, which parallel the chalk and the inclined layers above the brick earth, indicate that the chalk subsided and assumed its present position after the formation of the brick earth, i.e., in the Neolithic period or even later.

for the most part the layer rests directly on the chalk itself.

The weathering horizon under the upper younger loess has been observed before at the Carrière Hélin about 2 kilometers downhill, in clear sight of the upper edge of the CCC quarry. There, we attributed it to the Wurm II/III Interglacial but, here, in the absence of more than one loess, we cannot be so sure. The fact that it formed on disturbed green sand is no reason to equate it with the weathering horizon below the gravel at the base of the lower younger loess at Hélin, for we are more disposed to see the very-weathered pockets of Landenian as fulfilling that role much as they do in what must have been a similar section at the Mesvin trench as observed by Delvaux. In that case, the green sands here fill a position somewhere in the lower Wurm cycle but just where one cannot say. The Landenian below the weathering layer may or may not be in place; too little remains of it to say. There may also be some weathering of the upper surface of the chalk itself, producing soil of a rendzina type, but the weathered Landenian confused the observations. More interesting is the complex of deposits on top of the brick earth because the fields above do contain a number of surface Neolithic sites; it would be interesting, if the quarry does not destroy them all too soon, to determine their relationship with the complex soil structure, and the finds from the Ancien Houillière of Harmignies might help. If flints have been turning up in the various geological horizons, the method of excavating the quarry would preclude the recovery of many of them.

8 (3) Vellereille-le-Sec

The extreme erosion of the later phases of the Wurm glaciation, together with subsequent hill wash in the recent period, has removed nearly all the soil from the southwest slope of the cuesta passing under Vellereille-le-Sec. In many places the surface of the chalk is covered by a layer of soil so thin that broken lumps of chalk are almost as frequent as finer particles. In the fields south of the village (map, fig. 1, no. 9) and especially those downhill from the Motte de Vellereille (a supposed tumulus), there are a number of indications of old chalk pits and other cuttings plainly visible on the air photos and even on the ground itself. In the outcast from these pits and in the surrounding fields, several investigators have encountered worked flints of Paleolithic type and collections exist in the MHN and the Mons museum. The writer has also found several rolled and abraded Mousterian points on the surface, strongly patinated in white. The material in the Mons museum was gathered in 1922-23 by Jean Houzeau and others during a period when a number of formerly unused patches of land were ploughed for the first time. They are said to have come from an area approximating that of the writer's finds. Mousterian points again predominate, mostly small and not too finely fashioned, some showing evidences of rolling under the very thick white patina (fig.16, no. 6). Also present in the group are denticulated knives (nos. 9 and 10) or scrapers, approaching the La Quina type more closely than any of the finds which come from other sites in the Mons area. Also in the mixed assemblage are a number of bifaces--one or two of Micoquian (nos. 11-12)

or upper Acheulian aspect (nos. 17, 18)--showing strong signs of rolling and exposure. Upon examining the finds in the MHN reserves, we see that the mixture of periods in these surface finds is indeed impressive for, apart from the ubiquitous Mousterian points mostly worked on Levallois flakes (fig. 16 no. 13), we find very-rolled ovate and cordiform Acheulian bifaces (nos. 15 and 16), small triangular bifaces, large Levallois flakes and cores (no. 14). There is also a distinct assemblage of upper Paleolithic aspect (fig. 21, nos. 1-8), including a number of steep-keeled scrapers (no. 1), a few burins (nos. 3 and 8) and a number of round scrapers or scrapers on ends of blades (nos. 5 and 7). These upper Paleolithic pieces are not always patinated; often the black, translucent flint remains unchanged.

If we divide the collected material on the basis of patina and degree of wear, we can attribute the flints to a number of cultures. Easily distinguished is the upper Paleolithic assemblage discussed in the previous paragraph which seems Aurignacian and hence of Wurm II/III time. Then there are a number of slightly-rolled, finely-worked, unpatinated Mousterian points, often rather thick with careful surface retouch, pointing to the industries akin to those found at Stambruges and hence probably Wurm I/II. Perhaps a little earlier than these pieces, though not certain, are the relatively-rolled Mousterian points and denticulated scrapers with heavy white patina in the Mons museum. Earlier still would be the larger Levallois flakes, rather rolled and comparable to the flakes found in the St. Symphorien group of quarries in an interglacial stratigraphic position. These flakes are

probably accompanied by the smaller triangular bifaces and the pointed bifaces of Micoquian form. Finally, we have the very-rolled bifaces of middle Acheulian type which appear to be the oldest specimens in the group of finds. Some rather formless flakes found by the writer--all with rather large bulbs, very rolled, and no signs of a prepared striking platform--may be contemporary with them.

The present hydrographic situation of Vellereille-le-Sec is dramatically illustrated by the name of the commune and requires little further comment. It is clear that the hill top must have had quite another character as recently as the Neolithic period for all of the signs indicate a rather abundant occupation of the area over a long period of time. Today, there are no watercourses at all and the infertility of the fields is locally famous. There are some indications of dry valleys cutting the cuesta from north to south both in the modern relief and in the air photographs, but just when these watercourses actually were active is difficult to say in the absence of the Pleistocene cover. The rendzina soil which remains today is probably quite recent.

8 (4) The Estinnes, Bray

Part of the Mousterian occupation of the cuesta of Vellereille and High Harmignies must have extended over to the east along the upper courses of a stream (fig. 1, no. 10) which may have flowed parallel to the present course of the Ruisseau des Estinnes but which now remains only as a dry valley running in that general direction through Estinnes-au-Mont, Estinnes-au-Val and Bray, reaching the Haine north of Bray between Strepy and Maurages. The

implements in various museums, all surface finds (fig. 21, nos. 9-14), are fairly homogeneous. The types are those of the Mousterian of Acheulian tradition with wide triangular Levallois points bearing little secondary retouch, ovate and triangular bifaces and occasional thick knives. The patina on all the pieces is that of the white chalk variety, with little signs of rolling escept on one biface from Bray (no. 13). No further information is available on these pieces which all bear inventory numbers from the early years of this century in the MHN.

§ (5) The Asquillies Ravine

The By, as it flows between Bougnies and Asquillies, cuts a steep ravine into the soft Senonian and Turonian chalk. Penetrating through these layers, it reaches the lower Devonian; successively, the various stages of that deposit are exposed in the bed of the stream as one progresses northwards until the Grand Faille du Midi and the Carboniferous limestone outcrops are reached. The steep sides of the ravine show that the erosion is relatively recent but dry valleys (air photo pl. 2) testify to previous erosional phases. Just before one reaches the bridge over the By which carries the Givry-Paturages road south of Asquillies (fig. 1, no. 11), an area from which some Paleolithic finds have been reported is passed. In the hollow way leaving the Givry-Paturages road at right angles due east of the ravine, one can observe the superposition[1] of two loesses on a base gravel--the whole resting on the weathered surface of banks of

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1 Further details and section are in Dossier 151, #363, 364, Service Géologique.

flint representing the Nervien substage of the Turonian Cretaceous and known as the flint of S_t. Denis. From these tabular flints were made a number of implements found in the talus of the hollow way and on the surface near the now-vanished stream 200 meters west. The site probably represents traces of a camp along the stream visible in the air photo.

The finds in the MHN and a few in the Mons museum are all of a rather uniform nature (fig. 22). They are large Levallois flakes--one (no. 3) reaching nearly 20 cm. in length--lacking any trace of secondary retouch, with finely-facetted butts, and occasional reverse scars. The finds in both museums were deposited by De Munck at a very early date and he briefly mentions the site in 1886[1] among a long list of other sites known through surface finds. The flints probably come from the base of the loess and, being unrolled, can be presumed to have been found in place. The pieces in the Mons museum are somewhat less characteristic, though there is one which is probably a crude Mousterian point, relatively unrolled, and another, somewhat abraded, is even cruder, retaining portions of cortex in spots. The patina differs from the finds in the MHN and there is more than a suspicion that the find spots are not identical.

8 (6) Bois de Mons and Mt. Panisel

This peculiar double-humped hill has yielded innumerable surface finds (fig. 1, no. 12), mostly from the Neolithic and Mesolithic periods; however, among the hundreds of pieces in various collections, there are some of unquestionably Paleolithic facture. In the Mons

[1] De Munck 1886.

museum, there are a goodly number of finely-worked Mousterian points (fig. 23, nos. 1, 3, 5), equalled in quality only by pieces from Stambruges and by some selected pieces from the upper levels of the Carrière Hélin. They are all nearly unpatinated, with the edges quite fresh and with a careful over-all surface retouch. Some similar pieces in the MHN (fig. 23, nos. 6, 7) are not so well-worked but otherwise are identical with respect to lack of patina, fresh edges with slight bits of cortex remaining on some of the pieces. None of the Mons museum pieces exhibit this last feature though that merely may be due to selection on the part of the various collectors. One piece (fig. 23, no. 5) in the Mons museum is incompletely finished, having reached the stage of roughing out and partial edge retouch. The piece was abandoned before the over-all surface trim and final edge was completed. It is worked on a large thick Levallois flake, though the butt has already been removed so it is difficult to say more concerning the technique. One of the other pieces is a disc knife with very fine edge retouch (no. 4). Another piece (no. 9), somewhat rolled in appearance, bears a white chalk patina as does a very-rolled Acheulian biface (no. 10) of a type which points to the later phases of that development--all preserved in the MHN. The latter bears the date 1882, but we have no further information on its provenance other than the label itself.

8 (7) Flénu and Cuesmes

The Sites and the Finds: Five Acheulian bifaces from Flénu (fig. 24, nos. 1-5; fig. 1, no. 13) and one from Cuesmes (fig. 24, no. 6) are to be found in the reserves

of the MHN. The Cuesmes piece is described[1] as almond-shaped and belonging to Acheulian III and the Flénu pieces are said to be Micoquian bifaces, though it is clear that only two of them are really Micoquian types. Of the others, one is an ovate on large flake, one is a rather ordinary middle Acheulian almond-shaped type and the other appears to be a rough-out or a reject of a middle Acheulian almond-shaped type. Patina and degree of wear is of little help. Two of the pieces, one the rough-out and the other one of the Micoquian pieces, bear an inscription "Gisement à 0,60", presumably the depth of the deposit from the surface.

The Cuesmes piece bears a more definite label saying "Base du limon à 3 m. Exp. Rolland". A note in the archives of the Geological Survey in Brussels[2] gives the position of this quarry as approximately centered on the present Craibel cutting (fig.1, no. 14). The piece itself is a very elongated biface indeed with a reddish-brown patina, not particularly rolled, and coming in all probability from the weathering layer of reddened Landenian sands (fig. 25) just below the base of the loess in the Craibel quarries. In that case, the piece would be, at the latest, early interglacial in date. The pieces from Elouges which Breuil discusses[3] in connection with the above are not at all related and, in most cases, are badly eroded surface finds with every conceivable type and period mixed. There is only one reliable reference to the provenance of the Elouges finds, mostly collected by De Munck, in the literature[4].

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[1] Breuil 1934.
[2] Dossier 151, #395.
[3] Breuil 1934.
[4] De Munck 1900; also De Bove 1875, 1878.

Craibel has a large factory along the main railroad line from Brussels to Paris just south of the village of Cuesmes and its quarries, together with those of associated firms, exploit the chalk by means of mechanical excavators. The sections are observable today even from passing trains. In the quarry southeast of the triangle of intersection of the Cuesmes-Frameries road and the two railroad lines Brussels-Paris, Quievrain-Charleroi, one sees (fig. 25): brick earth on yellow loess with spots and concretions of chalk, the latter having a paler hard zone in its upper portion which may or may not be of stratigraphic significance; a reddened zone which is rather irregular in character and is often mixed with material of other colors ranging from white to deep brown. The whole is formed on a fluvial sand which can be seen to fill an old thalweg at several points. This fluvial sand, in turn, rests on a bed of Landenian sand which is also weathered and reddened in its upper portions and the whole reposes on a kind of tuffa.

The reddening of the Landenian is not unusual, and we have had occasion to remark on it in other places. The fluvial sands above are a bit of a puzzle and, in the absence of finds, there is no way to settle any questions on their date. They may well represent some phase of the beginning of Wurm; in this case the weathering visible in their upper portions is probably interstadial. Further study of these quarries would repay the effort, but the use of mechanical excavators and the extremely steep slopes of the quarry walls, together with the great mobility of the sandy deposits, makes examination of the upper reaches a mountaineering enterprise. It

was not possible for the author to get a satisfactory section over a reasonable length in the cuttings because of the effect of the teeth of the mechanical excavators.

8 (8) Obourg-St. Macaire; Obourg-Bosquetieau

The fields immediately south of Obourg, between the village and the Canal du Centre, are strewn with worked flints, mostly from Neolithic times but, occasionally, casual excavation has revealed Paleolithic settlement as well (map, fig. 1, no. 8, 15, 16). The region, known from the little chapel of St. Macaire and the wood which accompanies it, has long been the object of surface search by local antiquaries and, as a result, the museums are full of their finds. We do not propose to discuss all of these in detail for, in most instances, the exact circumstances of the find are not known. Such is not entirely the case with the flints collected by De Munck and deposited in the MHN, bearing the label Obourg-St. Macaire and Obourg-Bosquetieau (fig. 26) whose find spots appear to be well-marked on his map of 1890[1]. Both series are identical in type, though slightly different in aspect and patina. The Bosquetieau pieces have the reddish markings which indicate that they have been on the surface for an extended period of time while those from St. Macaire are quite fresh. Both groups belong to the Mousterian of Acheulian tradition including clear, large Levallois flakes (nos. 5, 6, 7, 8, 10, 11) on which are made Mousterian points (nos. 2, and 12) triangular

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1 De Loe and De Munck 1890.

points (no. 13), triangular bifaces (no. 9) and ovate bifaces (nos. 3, and 4). We have no direct evidence for the geological provenance of the pieces but it is not unreasonable to suppose that they come from the debris thrown up during the construction of the Canal du Centre or one of the many small chalk workings in the area.

8 (9) Mons Beau-Val

Two groups closely related to the earlier De Munck finds at Obourg, one of which seems to be marked on his map of 1890, come in the first instance from that portion of the outskirts of Mons which bears the place-name Beau-Val (map, fig. 1, nos. 17, 18, 19) touching on the northern edge of the Boix d'Havré on the route to Obourg (fig. 27); we pair with these pieces an isolated find in the Mons museum of a triangular Levallois point, bearing the date 1949, also coming from the Obourg road (no. 1). The Beau-Val pieces include several very large Levallois flakes (nos. 4, 9) and the usual assortment of Mousterian points on Levallois flakes similar to those from Obourg-St. Macaire. The other group (fig. 27, nos. 10-15) comes from the commune of St. Denis immediately north of Obourg (fig. 1, no. 20), the place-name Esplasse serving to fix the location approximately, and the find spot is fortunately marked on De Munck's map of 1890. The types and characteristics are the same as the Obourg-St. Macaire pieces, and it emerges from the consideration of the four sites--Obourg St. Macaire, Bosquetieau, Mons Beau-Val, Esplasse-St. Denis--that we probably have a series of contemporary open sites along the Obrecheuil,

the little tributary of the Haine which runs north-south through Obourg and St. Denis. One of the St. Denis pieces, in fact, bears a little label noting that it comes from the left bnak of the stream though the condition of the finds leads us to believe that they probably were found on the surface. They occasionally bear the date 1879 and all come to the MHN from De Munck.

8 (10) Baudour; Ghlin; Hyon; Mons; Survey Finds

Another small group of finds in the MHN, collected by F. L. Cornet from Douvrain (fig. 28, nos. 4-7, 9)--a suburb of Baudour (map, fig. 1, no. 21)--and bearing very early inventory numbers, are all of types which we have seen before in the better known quarries. The pieces are not patinated alike and can be divided into two groups--one largely red-brown and wind-polished, including Micoquian bifaces and late Acheulian knives and rather comparable to the things from the Hardenpont quarry; the others being triangular and ovate, thin bifaces. These are patinated white and are matte in appearance, though not rolled. They are probably the Mousterian of Acheulian tradition type encountered so often before.

From Ghlin (fig. 1, no. 22) come two small Mousterian points (fig. 28, nos. 1 and 2), one on a Levallois flake, the other worked on both faces. We know nothing further of their provenance, but they are unpatinated and unrolled and probably belong to the large group from the base of the lowest younger loess. They are probably contemporary with the other pieces we have been describing from along the northern border of the Haine valley.

Other such stray finds include (fig. 28, no. 8) an ovate biface from the Jardin Colonna at Hyon (fig. 1, no. 23) at the foot of the Bois de Mons which is probably to be classed with the Mousterian pieces from the Bois, and large Levallois flakes from Nouvelles (fig. 28, no. 3 and fig. 15, no. 2), probably from one of the Solvay quarries in that commune and to be classed with similar pieces from that group.

The writer's field survey has turned up a Clactonian core (fig. 30, no. 2), one in the debris thrown up during the cutting of the 17th century fortification for the defense of the Trouille near Harmignies--known locally as La Ligne (fig. 1, no. 24). The core is much rolled and abraded, patinated a typical brownish-green. An unfinished or rather crude Micoquian biface (fig. 30, no. 5) was found on the surface upcast near some sand pits at the place called Bonnet in the commune of Quevy-le-Grand, 400 m. from the Mons-Mabeuge road. The piece has a good bit of reddened sand adhering to it. The sand pit section showed a uniform humus formed on a disturbed Tertiary deposit. This section is of no chronological value.

A small collection of flints in the Mons museum bears a label stating that they come from the Chemin de la Justice in Mons (fig. 28, nos. 10-14). The group (fig. 1, no. 34) includes a "grattoir à dos abattu" of Gravette type, several other blade knives and a number of atypical scrapers, though one strongly resembles an Aurignacian end scraper. There are not a sufficient number of implements in the collection to make any deductions beyond its general upper Paleolithic character.

8 (11) Tranchee d'Angreau

The section at Angreau, north of Roisin (fig. 29) is no longer visible, though recorded fully by Ladrière[1]. Though we cannot trust his lithological description of the facies of loess present there, it is interesting to note that there do seem to be a rather large number of them, and indications are that the older pre-Wurm loesses may indeed have been visible. The prêle deposits too are apparently quite well-developed. We have found some flints (fig. 30, nos. 4-8) in the reserves of the MHN labelled as coming from this trench though, to our knowledge, there is no other record of them in the literature. The pieces, in extremely black-patinated flint with traces of black silt adhering to them, are not very numerous; but most are quite clear Clactonian flakes with large bulbs. A single Clactonian core also is included. The pieces themselves are rather much-rolled and the label attaches no stratigraphic indication. It would be rather tempting to assign them to a blackish weathering horizon (Mindel-Riss?) which Ladrière observed beneath the older loess, but there is no way to be certain. In any case, the rolling indicates that the pieces were not in place wherever they come from.

The upper layers of the Angreau trench (fig. 29) present no particular peculiarities, being two younger loesses. The layers below the blackish, lowest older loess are sandy clay, coarse sand, and lower gravels--all more or less typical prêle deposits. It is the

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[1] Ladrière 1890.

interesting series of middle layers, beginning with the so-called "fendillé", which we would like to know more about and, though chances for the freshening of the cutting are slim, a proper examination should be made one day. The cutting shows how little altimetric considerations cound when applied to these inland deposits. It starts at an altitude of nearly 70 meters and descends quite rapidly to 40, or 25 meters above the Haine, but, despite this, the layer indicated as the first of the older loesses seems to appear throughout the section. It is only the blackish loess and the upper prêle deposits which are found at the greater altitude; this is in reasonable conformity with the pediment theory of prêle formation.[1]

8 (12) Stambruges

One of the few instances where finds are present in known positions in the sandy deposits of the northern part of the Haine valley occurs at Stambruges. The site was noted in 1898[2]. Our only information on the work carried out in May 1927 by the MHN remains in the archives of that museum where a small drawing of the section is preserved together with some of the finds (fig. 30, nos. 9-13). The section shows a humus with Neolithic material formed on a mobile sand with blocks of Landenian sandstone which, in turn, rest on sands with coherent stratification containing a base gravel and Mousterian industry. Under that comes another sand with bits of gravel resting on the Landenian. The section comes from a sand pit known as the Sablière Amoisson. Later on, Habourdin fils carried out

[1] Tavernier 1954.

[2] Habourdin 1898, BSBG XIII, 1889, sess. 3 april.

a series of digs in the area which, unfortunately, have never been adequately published though the material, together with a well-drawn section, is in the Mons museum. Some limited references to his work were made later[1].

The Section Today (fig. 31): The surface soil is that of a forest, sands mixed with humus and flint pebbles. It rests on a yellow sand which has a band of little bits of phtanite and Diestien flint together with blocks of red sandstone from the Landenian, as observed in 1927. De Heinzelin notes the Paleolithic industry at this point. The gravel rests, in turn, on clayey brownish sand which covers a gravel identical in composition to the one above. Under that comes a current bedded sand layer and it rests on a surface of gray-white weathered Landenian. It can be seen that the upper sand is later than the late Mousterian industry which it covers. The implements in the MHN mostly have a black patina though one or two are in translucent gray-brown flint. They are more finely-worked than most of our other examples of Mousterian from the environs of Mons. Bifaces seem to be completely absent, and careful secondary retouch of the points seems characteristic. Cortex remains on only a very few of the pieces and blades are not common. Often the butt of the piece has been extensively retouched, removing the bulb and striking plane. The whole points to a definitely late Mousterian, perhaps contemporary with the so-called typical Mousterian of Wurm I/II or even later. There is practically no sign of rolling on the pieces in question,

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1 Bulletin des Naturalistes de Mons et du Borinage XV-XVI, 1932-4, p. 168; XXIX^{e} session, FAHB, 1932, p. 7 ff.; BSA.Br 58, 1947, 296 f.

though they are well-polished by wind-blown sand. This material, together with finds from Leval-Trahegnies and those from Caillou-Qui-Bique at Rosin, which we do not discuss here, are cited by De Heinzelin[1] as representing the typical late Mousterian in northern Hainaut. Together with the material from Soignies, they must await his publication.

8 (13) Forgeries

It would be remiss to complete our listing of the miscellaneous finds in the Haine valley without a few words on forgeries. The efforts on the part of local people, particularly in the village of Spiennes itself, to satisfy the demands of collectors for flints was remarked upon in Delvaux's amusing commentary on the excursion of the Societe Anthropologique de Bruxelles to Spiennes in 1886[2]. Among the creations of the local folk, most can be dismissed out of hand as ludicrous, but the efforts of the schoolmaster of Spiennes, Dethise, deserve special mention. Until his death in 1907, he produced literally thousands of false hand axes, flakes and points, a few of which are quite convincing when seen in isolation. The MHN had an entire reserve section stuffed with his creations purchased by the hapless Rutot. Many of these efforts do not deceive one for a moment and among these we number his confections of broken rock and flint to satisfy Rutot's demand for eoliths. In other instances, Dethise collected starch fracture flints. It was in his later years after his retirement to the eastern

[1] De Heinzelin 1949.
[2] Delvaux 1887/8.

end of the Haine valley that the production became a stream and the specimens piled up drawer deep bearing labels from almost all of the communes in the eastern Haine valley. We reproduce (pl. 3) some of his typical efforts by way of illustrating his "hand", for undoubtedly these forgeries have also penetrated other collections.

Characteristic of the work of Dethise, apart from the ludicrous "poignards" chipped on the ends of elongated nodules, are ovate and cordate hand axes which betray themselves by their extreme regularity and degree of approximation to geometrical form. His Mousterian points are quite good indeed and pl. 3, no. 6 would pass almost any day if one did not see a hundred identical pieces in the same drawer! Dethise loved the Turonian flint of St. Denis, easily-worked and taking a fine retouch with little effort, though most of the more successful productions are in the black flint of Obourg or Spiennes. He had a hand in the initial distribution of pieces from the Carrière Hélin and Hardenpont and a number of pieces coming from these sites, especially if they come from the excavation of the MHN 1902, are to be looked at with suspicion. The Mousterian of Acheulian tradition was Dethise's best style and he seemed quite at home in it, but his attempts at lower Acheulian and earlier pieces are always betrayed by their lack of wear, patina or by exaggerated geometrical form. He never succeeded with large blades or Levallois flakes. Other forgers have undoubtedly been active in the area, but their efforts are confined, for the most part, to the Neolithic and to the "improvement" of genuine pieces in an attempt to raise their value. Dethise, as far as we know, was the only one to attempt the lower

Paleolithic on a wholesale scale[1].

9) Untraced Sites

There are a number of sites mentioned in the literature which have been said to have yielded flints, but we have not been able to trace these finds. Among them are finds from the Tranchée de la Garenne (fig 1, no. 33) at Boussoit-Havré and pieces from the railway trench of Paturage[3] (fig. 1, no. 32). We have also not discussed some minor finds of mostly Mousterian of Acheulian tradition type in the MHN from Gottignies and Ville-sur-Haine (fig.1, nos. 30 and 31) whose find spots are noted on the 1890 map of De Munck; and we have not discussed the two highly-eolized bifaces in the Mons museum coming from the sand pits of Peissant.

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1 De Heinzelin plans an exhaustive article on these forgeries in a forthcoming number of the BIRSNB.

2 Cornet 1872.

CHAPTER IV

THE PALEOLITHIC PERIOD IN THE HAINE VALLEY--CONCLUSIONS

Chronology of the Finds

We have tried to present, within the great limitations of the factual evidence, a detailed summary picture of the Haine valley material seen as a whole. We now will try to show how this relates to the present state of affairs in the study of the Paleolithic in northern Europe.

The oldest Haine valley archaeological specimens may be the much-rolled group of cores and flakes from the Mesvin trench and from the lowest levels of the Carrière Hélin, together with several surface finds without geological context. These cores and flakes all seem to be worked in the technique known as Clactonian, have a more or less common patina (reddish-brown or orange) and, if defined carefully, are surprisingly fewer in number than is usually thought to be the case. Whether or not they represent a stage in the production of hand axes, or even working debris from that production, seems hard to decide from the evidence in the Haine valley. It is tempting to think that they do, not only because they are found in the same strata as early hand axes but because they are probably made of the same flint and have suffered similar transport. The whole question of the existence of the Clactonian as a separate "culture" is at stake. We are tempted to consider it as a technique and nothing more. The finds in the Haine valley in no instance occur in their original position and hence are not exactly datable. All clearly-

identifiable specimens are much-rolled and even their authenticity as human productions was at one time disputed. In no case do they occur in strata which can be unambiguously ascribed to a period prior to the Riss-Wurm Interglacial[1]. Pieces from the base of the Carrière Hélin are difficult to deal with because of an apparent mixture of finds in the gravels emanating from two different periods or techniques. Those from the Mesvin and Spienne s trenches all seem to have come from a weathering horizon below the gravel of the younger loess which we have considered to be Riss-Wurm Interglacial in date. It is formed upon a fluvial sand which may have been deposited at any time during that interglacial, if valley subsidence is a factor or, if it is not, in a cold or wet phase during its course. In either case, the instruments were no longer in their previous position, whatever thay may have been. As a lithic industry, the Clactonian flakes are most unexciting for they are evidence of an appallingly low level of technique; whether this is in itself a proof of antiquity must rest on deposits other than those in our area where geological context as well as typological considerations may be more illuminating. Zeuner[2] and Breuil[3], along with others, have treated this class of implement as a separate industry and Breuil, following his doctrine of parallel evolution of flake and core industries, tends to place it among the ancestors of the Mousterian, hence implying some connection with Neanderthal man. The outlook of Breuil and his followers, attributing industrial techniques to biological groups,

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[1] This would tend to support Charlesworth 1957, p. 1016 f. who places Clacton and Hoxne in the same position.

[2] Zeuner 1952.

[3] Breuil 1932.

does anyone support such a thing?

has less favor today, but the extent to which it has penetrated current concepts of the lower and middle Paleolithic industries is very great.

Zeuner accepts the Clactonian as a quite separate industry from the Acheulian and places it contemporary with the late Abbevillian or lower Acheulian, though related to Abbevillian in technique. The so-called stage of Clacton II, to which most of our Haine valley pieces belong, is thought to be early Mindel-Riss Interglacial in date and is stated to be definitely prior to any appearance of a "Levalloisian". We must note, however, that our Clactonian pieces occur in the Haine valley with pieces which might well be described as Acheulian (of which more in a moment), but we cannot prove if the association is direct or fortuitous, though we incline toward the former. We are further willing to accept the date of the lower Acheulian as Mindel-Riss in the broad sense. In Belgium, our only knowledge of the Gunz and Mindel glaciations and the relevant interglacial deposits are limited, for the most part, to sands utterly unconnected with any implements[1]. There seems little way of showing that the deposits of workable flint in the Haine valley were even exposed prior to Riss times. To assign the Clactonian implements to anything even approaching the Mindel glaciation, much less prior to it, would be utterly unfounded on the evidence at hand. The entire morphology of the valley argues against it.

The Clactonian from Barnfield pit at Swanscombe in the Thames valley is stated by Breuil[2] to be similar to

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[1]Tavernier 1954.

[2]Breuil 1932.

that of the Spiennes-Mesvin trench. We think that the cores from the Spiennes-Mesvin trench are considerably smaller and more carefully worked than those from Barnfield pit. There are undoubted similarities in the flakes, but the type site at Clacton-on-Sea contains implements much more closely approaching those of the Haine valley. The original publication by Warren[1] referred to the site as the "Mesvinian" industry at Clacton-on-Sea. The material here is thought by Oakley[2] to be a bit later than that at Swanscombe, and he goes so far as to specify a Clacton IIa and IIb. Unfortunately, the type site has not been dated geologically, and we are forced to deal with the less than satisfactory Swanscombe affair. Zeuner[3] claims that there a decalcified loam with hand axes has its surface at 35 meters above sea level. This is equated with Depéret's Tyrrhenian high sea level, equivalent to the Mindel-Riss Interglacial in a late phase. The actual aggradation terrace is thought to contain the famous Swanscombe skull and more middle Acheulian implements. The lower Middle Gravel also contains middle Acheulian and the early Clactonian is located in a loam resting on a lower gravel which, in its turn, rests on Thanet sands contemporary with the marine facies of the Belgian Landenian--Eocene in date. The entire succession is stated to be Mindel-Riss.

Breuil acknowledges[4] that bifaces form a definite association with the Clactonian pieces at Mesvin, though he tries to avoid the obvious implications by

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[1] Warren 1922.

[2] Oakley and Leakey 1937.

[3] Zeuner 1952.

[4] Breuil 1934.

claiming that they are really"adaptations of a core" rather than true bifaces. It is true enough that, at Hélin, there are no bifaces known from the base gravels, though they contain flakes with technique nearly identical with those of the Spiennes-Mesvin trench. In Breuil's opinion the Clactonian exists in Belgium before the Acheulian and develops later into an industry transitional between it and the primitive Levalloisian. The first industry is supposed to be before the beginning of the filling-up of the 30 meter terrace. However, altimetric correspondence between the weathering horizon at Spiennes-Mesvin and that observed at Swanscombe is fortuitous. At any rate, in the Somme valley--the keystone of Breuil's system upon which the analysis at Swanscombe is said to have been based--there is now every reason to doubt the validity of his altimetric interpretation. Bordes in 1950 argued against the scheme proposed by Breuil and claimed that the base gravels of the 30 meter terrace should be taken as the end of the Mindel-Riss Interglacial. We should like to recall the warning given by Flint[1] that the drowning of river mouths in interglacials and the consequent silting up, or the downcutting during glacials "does not imply that fluctuations in sea level alternately slacken and accelerate all streams. The response of a stream to a change in sea level depends on the shape of its long profile, the volume and grain sizes of the load of sediment it is carrying, the configuration of the sea floor off the stream's mouth, the local stability of the Earth's crust and other factors[2]. It follows that no two streams will respond in just the same way to fluctuations

[1] Flint 1949, p. 450.
[2] Our italics.

25 years not more!

very incomplete

of sea level." Hence, we believe that it is unsafe to assign a terrace to a particular epoch on altitude grounds alone, unsupported by a succession of weathering horizons, fossils, etc.

The lower, middle and upper Acheulian is represented in the Haine valley in several sites: at the Spiennes-Mesvin trench; at the Carrière Hardenpont; in a number of other finds from the various smaller phosphate quarries; and in a peculiar form at the Carrière Hélin. In most instances, the finds in the various museums are in a rather sorry state from the standpoint of associated finds or definite provenance, but we have been able to build up a fairly consistent picture for the material. We do not deduce much from the form of the bifaces except to note that the middle Acheulian predominates by far. Lower Acheulian pieces from the Spiennes trench exist, though rare. They are more plentiful from the Carrière Hardenpont but are absent elsewhere. In all sites in the region, with the possible exception of the Carrière Rolland (Craibel), all Acheulian pieces are more or less rolled, and they occur nearly always under a layer of weathering best attributed to the Riss-Wurm Interglacial. They are accompanied by proto-Levallois flakes in one or two places but, for the most part, the accompanying flakes are not known since they were rarely collected in the majority of the quarries. The upper Acheulian is confined to a number of rare Micoquian bifaces related to flake industries grouped under the "warm" Mousterian.

The lower levels of the Carrière Hélin yield an atypical industry containing rolled Levallois flakes without

bifaces in a geological context which has been variously interpreted but seems to us to be Rissian. We cannot be more specific than this. This is what De Heinzelin calls "Mesvinian, type Breuil" as distinct from the "Mesvinian, type Delvaux" which he reserves for the Clactonian from the base of the Spiennes-Mesvin trench. The atypical material seems most nearly comparable to a flake industry found at Cagny-la-Garenne near Amiens[1]. Bordes regards this site as illustrating the beginnings of Levallois technique in a late Acheulian milieu. Breuil thinks that the finds from the Carrières Lefébre come from the middle terrace of the Avre as do those from La Garenne. It is his opinion that the finds of flakes from both quarries have no technological relationship with the older Levalloisian (the Levallois I and II whose existence Bordes and Vaufrey deny), and he notes that the pieces are thinner and more twisted than the pieces of Levallois III and IV. Until recently Breuil considered the pieces as a kind of proto-Levallois but, in the paper cited, he opines that the majority of the finds are either reducing flakes from large lumps of flint or from bifaces. He admits that there are several discoidal nuclei in the series but thinks that, if it were a question of a true proto-Levallois, there would be many more. He grants that facetted flakes have been found at St. Acheul coming from the Atelier Commont but thinks that the flint at Cagny, which is of very bad quality, might have required facettage to permit chipping. Hence he thinks that these flakes of Levalloisian aspect were struck from the edge of a biface during fabrication and not from a prepared nucleus. The material is alleged to be similar

[1]Breuil and Kelley 1956.

to that from Hoxne in Suffolk where West and MacBurney[1] also concluded that similar flakes with facetted butts were biface wasters.

The theory of parallel phyla, as Bordes calls it, which maintains that there exist separate cultures of flake and core tools, is much embarrassed by material of the Cagny type as well as by that of the Mesvinian with bifaces. There are no demonstrable bifaces connected with the Carrière Hélin assemblage, but the flakes are nearly identical with those from Cagny where bifaces do occur. Bifaces in considerable number, both of middle and late Acheulian aspect, are available from the Spiennes trench where very similar proto-Levallois flakes are found in the same layer and with much the same degree of rolling and patina. It cannot be denied that the production of these flakes may be an aspect of biface production but that does not change the fact that the mutual exclusiveness of the two types of industries is seriously compromised. In the case of the Haine valley pieces, the proto-Levallois flakes occur with rolled bifaces of middle Acheulian type, with wavy edge and wide shallow flake scars, only at the Spiennes trench.

The small number of Micoquian bifaces which exist all seem to come from the westernmost of the quarries studied. Flénu has yielded a few from an unknown location, while the rest come from either the Spiennes trench or from some of the Solvay quarries nearby. The pieces are all rolled and, for the most part, come from the gravels at the base of the younger loess.

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[1] West and MacBurney 1954.

The most widely represented industry in our area is that of the Mousterian with bifaces, also known in the literature as the Mousterian of Acheulian tradition or the Levalloisian V of Breuil. It occurs in nearly every site in the valley, is the most frequent of the surface finds and is consistently found in the same stratigraphic position in the mixed gravels at the base of the younger loess I. This is its standard position in most west European sites where the geological situation is clear, and it presents no special difficulties or character in the Haine valley. Rather, it serves as a convenient fixed point about which the other industries can be ranged. The pieces are generally located directly above or on the weathering horizon which marks the final phase of the last interglacial, during which the first of the younger loesses already began to make its appearance by a process of slow sedimentation.

The "typical" Mousterian, corresponding largely to the Mousterian of the caves of southern France and those of the Meuse valley in Belgium, occurs only at open surface sites like Mt. Panisel, Vellereille-le-Sec or in sandy sites like Stambruges and is uniformly without bifaces in these places. In some instances (St. Symphorien?) where erosion has caused a mixing of the gravels of the various younger loesses, pieces may occur together with the older Mousterian with bifaces, but it is nearly impossible to sort them out of the assemblage with any certainty. The last phase of the Mousterian occurs in a context which may be Wurm 2/3 Interstadial at Stambruges, though that is the only site of the type in the valley.

Clearly-identified upper Paleolithic industries of the last interstadial have not been found in situ but they occur as isolated type implements in the gravel of the third youngest loess in a number of places or in a weathering horizon in its upper portions (Ciply quarries). Unfortunately, this gravel often has pieces of other periods as well incorporated during erosion of lower layers. The Aurignacian seems to be the most commonly represented, but the finds are too few or too mixed to be more precise.

The Question of Statistical Interpretation

Bordes, in recent years[1], has argued for the necessity of a statistical interpretation to separate out the many aspects and variants of the younger loess industries on a sounder basis. This is also the foundation of his branching theory of tool evolution. It is not practical to use statistics in the Haine valley for several reasons. Most finds are old ones coming from collectors who acquired them from the workmen and, with very few exceptions, cannot be counted upon to be a representative selection. There has been a considerable mixing of the finds due to poor museum practices during Rutot's administration at the MHN, to say nothing of the chaos at the Mons museum, and the divisions which now exist would more nearly reflect the efforts of De Heinzelin and others to put things in order. The only practical way to find out if the statistical method of Bordes adds any new information would be to re-dig the various sites under controlled conditions.[2] Furthermore, the erosion producing

[1] In a series of papers between 1950 and 1954.

[2] Much is hoped for from De Heinzelin's new excavations at Hélin.

mixed gravels is more strongly marked here than in western France and that may seriously complicate new investigations. In any case, we do not have very great confidence in certain aspects of Bordes' statistics for a number of reasons.

Bordes, positing that the various industries may have local variants which might otherwise pass unnoticed if only a few objects are considered, has worked out a list of types for almost all of the flints encountered in the middle and upper Paleolithic. Finds must usually be from a properly-conducted excavation so that nothing is left out. A large number are then classified according to the list. The percentage of each type is noted and this is plotted as the ordinate on a cumulative graph with the type numbers generally running to about 60 as the abcissa. Bordes has found that some of the classical cave sites in southern France give a broken curve of very characteristic shape. The sites in northern France do not present the same type of curve at all, largely because the number of scrapers is very much greater than in the southern sites. Therefore, to compare the two, he artifically equates the percentage of scrapers in the two sites to be compared, considers the remainder of the types according to their percentages and re-plots the result. The agreement between the resulting curves is often startling. From this, he has been led to pair a number of the northern sites with the southern ones.

This type of statistical presentation by means of the cumulative graph, has certain apparent advantages as a rapid resumé of all types present. The greatest disadvantage of the system is that it tends to concentrate

attention on the most common objects, since they have the greatest influence on the shape of the curve, and tends to obscure the numerically less important types which, on the whole, may be more suitable for characterizing the group involved. Most middle Paleolithic cultures have a great deal in common as far as tool inventory is concerned, and the method tends to stress these common features at the expense of the less common equipment which may vary sharply enough from one group to another and, in fact, may be more important for making distinctions among them. In formal statistical terms, the procedure is unsound for it fails to weight the statistics appropriately so that objects present in large numbers in almost every site will not have undue influence. The crude attempt at weighting, represented by the deliberate equation of the scraper percentage in the north with that in the south and producing the so-called "phantom" curves for the northern sites, is very unsatisfactory. There is no way of knowing whether this weighting is meaningful in terms of historical reality or whether it is merely juggling with numbers.[1] If we knew how to weight the various percentages of types so that those which are important for determining the local variant stood out, there would then be no need for the analysis in the first place; we would already know which types were significant and if a local variant indeed existed! Bordes freely admits that regional ecological differences may play a considerable role in influencing the shape of the curves and that availability of suitable raw material

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[1] MacBurney's objections that the categories are unduly arbitrary assumptions concerning the intentions of the makers and that the number of transitional types makes them too hard to apply are also serious. (West and MacBurney 1954).

is certainly a factor as well but, in the hands of the less critical user, Bordes' cumulative graph is in danger of serious distortion. The enthusiasm with which it has been received, as evidenced by the articles in the French periodical literature, shows that it is fast being elevated into a position which is far beyond its true capabilities as a graphically summarized trait list. This is perhaps due to naive awe on the part of some French prehistorians for a method which appears to promise precision of interpretation through a purely mechanical procedure.

A second type of statistical presentation concerns the various techniques of working stone and is more or less independent of the type of implements involved. The criteria for these are: the percentage of Levallois flakes, blades and points vs. all types of flakes, blades and points (Levallois Index); the percentage of facetted butts among all recognizable butts (Facettage Index); the percentage of blades among all blades and flakes (Blade Index); the percentage of all flakes and points with Levallois technique against the over-all number of all types (Levallois type Index); the percentage of scrapers compared with all types (Scraper Index); the percentage of backed scrapers and bifaces against all types (Acheulian Index); the percentage of backed scrapers alone against all types (Acheulian uniface Index); the percentage of bifaces among all types including bifaces (Biface Index); and, finally, the percentage of simple convex and transverse scrapers against all tools including these types (called the Charentian Index). The foregoing indices are displayed by means of a bar graph, with

histogram

numerical percentage plotted as ordinate and the various indices as abcissa. The bar graph is a good summary of technique employed at each site.

The analysis of technique is less open to criticism and, in our opinion, really represents a step forward. Essentially, the system of Paleolithic classification since De Mortillet has been based on the concept of the evolution of stone-working techniques. It is true that type objects for each period are recognized, but these types are strongly influenced by techniques existing at the given time. If the objects are collected in bulk from a properly-conducted excavation, there theoretically should be no objection to making statements about relative technique preferences more specifically numerical, but we must be careful not to be misled by small differences in percentage which may be meaningless when comparing two similar sites. It seems to us that simple qualitative statements about the abundance of each category of technique (rare, some, many, etc.) would suffice and would be free of the specious accuracy conferred by actual numerical percentages.

We believe that, on the whole, the summary of techniques by bar graphs has more theoretical soundness than has the cumulative type graph. In the former, the predominant (and significant) technique appears clearly; in the latter, the predominant type tends to mask possibly significant but less numerically important types.

We have digressed at length on this subject of statistical presentation because we have not used it in dealing with material from the Haine valley and,

inasmuch as it is very much à la mode at the moment, that has called for some justification.

Our views on the numerical methods of Bordes do not prejudice our opinion of his general theory of a branching development of industries after the transition from the lower to the middle Paleolithic. In general, there can be little doubt that diversity in technique and an enormous increase in the number of available tool types is clearly marked once we enter into the realm of industries connected with the younger loess or with the weathering horizons of the preceding interglacial. This seems to reflect a very important step in human history, and probably resulted in a marked increase in productivity with consequent effect on the relationships between men. We would like to say social organization, but we cannot prove that the concept has meaning at such an early period. Certainly Bordes' theory is in greater accord with the available evidence than is Breuil's and, basically, it does not do violence to the linear evolutionary scheme of De Mortillet. The main vertical stages are retained, but much richer horizontal detail is added.

The evidence which we have presented for our study varies on two levels in its reliability. First of all, there is considerable uncertainty about some of the factual data; more important still, there is much uncertainty concerning just how much historical information we can deduce from the mass of material which we know to be reasonably correct. In the first instance, we have to understand that confusion has been sown in our minds through

the varied interpretations of the stone tool material in terms of technological groups, in terms of productions of ethnic, racial or more general biological units, or in terms of the more vague "culture". Bordes, for example, even goes so far as to speak of tribes. Breuil thinks largely in terms of racial groups or groups of different species of men. The 19th-century authors like De Mortillet regarded the distinctions in the tool series as stages in the evolution of stone-working technique. The vast majority of workers have chosen to avoid the question entirely. Others, such as Commont, De Heinzelin and Bordes himself to some extent, merely regard the tools as useful "fossils" which serve as indicators for correlations of the various facies of the geological deposits with one another. Zeuner tends to regard the different tool industries as specialized responses to different ecological conditions and hence largely conditioned by regional climatic variation.

But what actually is the nature of the evidence which we have for the lower and middle Paleolithic? Is it not simply the stone tool assemblages themselves in the northern sites with animal remains added in the very few cave sites as old as this in the south? At first sight, all our elaborate geological apparatus can give us is a check on a rather detailed chronology for the evolution of stone tools and the techniques for making them known by purely archaeological methods. This is essentially the "meuble à tiroirs" of De Mortillet[1]. We know that the detailed climatic history of the areas in question, as deduced geologically, is in a far from

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[1] De Mortillet 1872.

satisfactory state. The correlations of tool type and technique with climatic variation, characteristic of analyses from Commont on and originally intended to elucidate the character of the different layers in which the implements were found for correlations over long distances, have been distorted and canonized into a system which invokes a climatic interpretation of prehistory. Flake tool industries were alleged to be connected with cold phases, core tools with warm phases. Breuil carried the process one step further, associated different species of men with these climatic variations--Neanderthal or his predecessors with the cold phases and Sapiens with the warm phases--and attached tool complements, "the one cleverly alternating with the other" as Bordes puts it. How thin the evidence for all this is! What are we to make of the "warm" Mousterian? What are we to make of the flake component of the biface industries, or of the biface component of the flake industries? Or, for that matter, how many instances are known of direct association of human remains with implements in a relationship which demonstrates the theories of Breuil?

Zeuner's argument is an ingenious attempt to infuse new life into the climatic theory. He is surely correct in postulating an ecological influence on tool types. But that does not deal with the fact that tool evolution seems to be one of more or less continued advance, and types seem to become more and more diversified as one moves forward in time. The ecological influence must, of course, have made itself felt in selection at any one time and place from among the available types and

techniques; this is possibly reflected, for example, in the great number of scrapers in the northern groups like those in the Haine valley.

Bordes mentions "tribes" in several places, and it will be charitable to assume that he does not mean the term in the strictest ethnographic sense. Nonetheless, he does seem to imply that different ethnic entities are involved in the production of the differing tool groups, which are seemingly contemporary chronologically. The assumption, presumably derived from the prehistory of later periods or from ethnographic observations, cannot be substantiated for the lower and middle Paleolithic where such a tiny fraction of the material culture is preserved and where time intervals are so great. The assumption also inherently lies behind the objections which Vayson de Pradenne and De Morgan originally raised to the finer distinctions of Commont's sytem and which Dubois utilized to negate the utility of archaeological material for geological cross-dating. Today, we do not go so far as Dubois, for the number of correlations between the archaeological material (especially when finely differentiated) and stratigraphic features indicative of long-enduring, widespread phenomena are too great to be ignored. But the geological measuring instrument is far too coarse to indicate whether the varied tool assemblages within the same period indicate a delicate chronological, ecological or an ethnic separation; or all three; or any combination of them. The evolution of tool types and techniques need not necessarily have proceeded

with the smooth and certain evolution proposed by De Mortillet though we cannot but analyse it as if it had. It is implicit in the 19th-century view that any local differences appear to be largely chronological. On the other hand, we cannot reject these differences as of no importance. There are major groups, roughly contemporary, in both the same and different regions, which do differ sharply, as shown clearly by Bordes' technique index statistics. We cannot regard these differences in technique as purely ecological as we can differences in choice of types, since we assume that over the vast periods of time involved all groups within an area as small as France, Belgium and western Germany were privy to roughly the same degree of "know-how". They must therefore be of some chronological significance in the acquisition of newly-discovered techniques; but the role of the time lag in this remote epoch is more impossible to judge than it is later on where it is generally assumed to be negligible or nearly so.

Hence, we return again to the theoretical basis underlying the interpretation of De Mortillet. We have gotten little further than a history of the evolution of tool-making techniques and, to some extent of tool types; of that much, we are reasonably sure. But if that much is sure, it can be used for further analysis only along the lines suggested in the assumption that the tools and their technique of manufacture is a reflection in material form of man's increasing knowledge of how to adapt to his environment.

We believe that, because of the very limited nature of the evidence, a regional study such as this one does not entitle us to draw general historical conclusions. What seems to be needed is the writing of a number of such studies covering all of the areas of interest in equivalent or greater detail, so that the precise evidence (and its limitations) is presented in unified and reasonably complete form. Such a collection of data could well serve as the starting point for the type of interpretation which we think ultimately desirable. The possibilities of drawing conclusions about the local variations which appear in the detailed study can only, we think, be fully achieved within the framework of a general treatment of the whole of the period in question.

We can establish, to some extent, the trend of development in man's efforts expended upon nature and consequently deduce some idea about t he degree of organization needed to effect that effort. We have evidence in our hands in material form of the activity lying at the basis of human progress. What we lack are the other details which would enable us to give this barest of content a rounded and fully comprehensible form. That we shall ever have this from so remot e an epoch as the lower Paleolithic seems improbable. Perhaps we shall always be forced to extrapolate back from the much better understood upper Paleolithic and assume that the social and historical forms were simpler and more primitive. Our method of interpretation has unfortunately not tended towards the same simplicity.

CHAPTER V

MESOLITHIC SETTLEMENT IN THE HAINE VALLEY

With the close of the glacial period represented by the third Wurm advance, conditions in the Haine valley were not too favorable for human occupation. The loess steppe probably was quite dry and inhospitable. However, the sandy areas north of the Haine apparently were somewhat productive of small game, etc., and most of the occupation during the earlier phases of post-glacial history took place there. As the forests thickened, evidenced by the formation of the brick earths during the climatic optimum[1], occupation also spread to the forests on the southern slopes of the valley. In no case was occupation ever very dense, and we may suppose that the few sites in the area represent short-lived visits by migratory hunters and gatherers.

The sites in the Wood of Obourg-St. Macaire

The earliest evidence for post-glacial human occupation in the Haine valley comes from the little wood of St. Macaire to the east of Obourg (fig. 32, no. 1). Here, between 1955 and 1957, a group under Letocart[2] excavated a site which delivered only flint remains. The material was found scattered at a depth of about 40-60 cm. below the surface, in a soil whose cutting is represented by a 15 cm. development of humus, 35 cm. of yellowish sand, 10 to 40 cm. of clayey yellow sand--the whole resting on weathered chalk. Unusual difficulty

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[1] Dudal 1953.

[2] Letocart 1956.

was encountered by the excavators due to the dense undergrowth and the penetration of the soil by numerous roots. In the small-scale operations thus required, no traces of structures of any kind were evident. Some of the representative finds are illustrated in figure 33. The types are almost all worked on blades of Obourg flint, which, in the soil conditions prevailing, has acquired a bright bluish patina. Characteristic are a series of points (nos. 5 and 9), points blunted on one edge only (no. 7), a considerable number of end-of-blade scrapers (no. 12) and a variety of small awls worked on the ends of small blades (nos.1, 2, 3, and 6). Obliquely retouched points (no. 4) also occur. Burins and gouges (no. 11) were found occasionally. The most characteristic pieces are the large awls worked assymetrically from two sides on the end of a large blade (no. 8) which seem to correspond to the "zinken" of Hamburgian type[1].

The site does not belong to the tanged point group[2], but it is late Glacial as evidenced by its geological position in the Obourg sands. These sands, never adequately studied since the early work of Cornet[3], are wind-blown, Tertiary in origin, and cover the last Wurmian loesses in sections obtained in various parts of the northern section of the valley. They never cover the brick earths except where later drifting has occurred (as at St. Symphorien)[4]. Cornet discerned two layers and

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[1] Schwabedissen 1954.

[2] Clark 1936.

[3] Cornet 1898.

[4] De Munck 1890.

the St. Macaire site seems to be located at their junction. The presence of several blocks of sandstone in the site area noted by the excavators[1] is naturally present in the base deposit, as observed previously by Cornet.

The lower of the two sands, later than the Wurmian loess, cannot of course be accurately dated, though parallel situations exist in many parts of Flanders, where such deposits are usually assigned to the Dryas period. It is not impossible that the lower sand is older Dryas and that the upper is younger Dryas with the horizon separating them representing the Allerød oscillation. This would tend then to confirm the attribution of the site to immediately pre-Allerød times, if not to a "Hamburgian culture". The hopes of the excavators for a pollen date is probably doomed in the sandy soil. The industry has some analogies with the lower Zonhoven types of Hamal[2], in that the horseshoe scraper exists together with Ahrensburg-like points, but the over-all impression is that the material is less advanced. There seems to be little relationship with the Remouchamps material[3] since the large irregular triangles and points blunted down the whole of one edge typical of that site are absent while Remouchamps lacks the "zinken". Material from Chaleux[4] which is true Magdalenian seems a bit earlier. Hence we propose a dating roughly midway between the Hamburgian and the "Federmesser" groups.

1Letocart 1956.

2Hamal 1909.

3Rahir 1921.

4Rahir 1921.

Maglemose Sites at Pommeroeul, Obourg, Mons

A rather harsh climate, represented by the return of dry tundra conditions during the younger Dryas and Pre-Boreal periods, are reflected in the deposition of the upper layer of the Obourg sands, and the Haine valley seems to have been devoid of human occupation during this time. It was not until the amelioration of conditions at the end of the Pre-Boreal phase and the transition to Boreal times that traces of human occupation can again be found[1]. These are represented by two harpoons of nearly identical type, corresponding to Clark's[2] form 9, one (fig. 34, no. 21) is from Pommeroeul (map fig. 32, no. 3), found in 1839[3] and recently republished[4]. The other is from Obourg-Ferme des Wartons, now in the MHN, published some time ago[5] and again more recently in a survey of such finds in Belgium[6]. The Pommeroeul harpoon is nearly intact (16.4 cm. long), has eight barbs cut and grooved with a straight transverse filing motion and, while some of the grooves are rectangular in outline, others are slightly deeper at the bottom adjacent to the next barb toward the point. This type with straight cutting corresponds to the later types recently studied by Clark[7] and can be paralleled with the finds ranging as far apart as Yorkshire and Estonia. The Obourg harpoon is very similar in type to the Pommeroeul specimen, though it is shorter (12.9 cm.) and not as well preserved. It has more frequent barbs,

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[1] Finds are later than those of Starr-Carr, Clark 1954; and Godwin et al. 1957.
[2] Clark 1936 (fig. 42, no. 9).
[3] Scheuermans 1890 for an account of its vicissitudes.
[4] Adam et. al. 1953.
[5] Breuil 1926.
[6] Saccasyn 1945.
[7] Clark 1956.

twelve of which survive, and is broken off, the remaining portion presumably having had still more barbs. It was found in unknown circumstances between 1879 and 1884 at the farm lying between Obourg and Maisières (fig. 32, no. 4) and is sometimes listed under the name of the latter commune. Both pieces were found in alluvial or peaty deposits as evidenced by their brown patina. Both are made of bone, worked by groove and splinter technique.

Similar finds are known throughout the Scheldt valley[1] and one must conclude that the occupation was fairly continuous geographically speaking. Adam and his co-workers mention finds of flint of Maglemosian aspect from the Port-du-Parc, Mons (map fig. 32, no. 10) in discussion of the Pommeroeul harpoon[2], but we have been unable to see these objects. They are described as two axes and an antler awl and are alleged to be in the Mons museum.

Another group of finds from Mons Beau-Val (fig. 32, no. 5), previously unpublished, is unclassified at the MHN though labelled "Azillian". Coming from the De Munck collection, it is pictured here as figure 34, nos. 1-7. Included types are a nucleus for [illegible] simple microliths (no. 1), a broken triangular point (no. 2), a point with retained bulb of percussion (no. 3), two tranchet arrowheads (nos. 4 and 5), an angle burin with retouched base (no. 6) and a roundish awl-cum-scraper (no. 7). The assemblage looks rather like the usual

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[1] Doize 1952 and Saccasyn 1945 who list together some 18 or 19 examples.

[2] Adam et al. 1953.

flint accompaniment of the Maglemosian, and it was found not far from one of the harpoons and the other flints referred to above. There is no basis for attributing it to an "Azillian" in the absence of colored pebbles or characteristic harpoons.

Azillian sites have been alleged[1] to have been found at Vellereille-le-Sec, Bray, Jemappes, Binche, and Le Roeulx, with industry of nucleus, scrapers, blunt-backed blades and microliths, distinguished from the Tardenoisian by their larger dimensions; but these finds are merely selected out of the large surface scatters occurring in these communes, and cannot be thought of as Azillian in the absence of the characteristic components of that culture. If one could isolate a pure group of such finds in an appropriate context, they might be found to be part of the Maglemosian occupation of the Haine valley.

Occupation of the Valley during and after the Climatic Optimum

During the Atlantic period the forest of Oak and Hornbeam reached its maximum density on the loess slopes of the southern part of the valley. From this period probably dates a site found by the author near the Bois Abrassart, high on the plateau overlooking Harmignies (fig. 32, no. 2). Here, a surface scatter of flints can be followed down to finds imbedded deeply in the brick earth exposed in sections made by the encroaching quarries of the Cimentries d'Harmignies. Though no microliths were found, three cores (fig. 34, nos. 14, 19 and 20) were picked up, one of which (no. 20) is a rare handled type,

[1] Saccasyn 1946.

normally occurring much further to the east and north[1]. Projectile points (nos. 15, 16 and perhaps 17) are of types normally associated with later phases of northern forest cultures[2]. The presence of the "orange quarter" (no. 18) is a typical inclusion in some of the Belgian sites[3] of this little-understood period. From the position and character of the finds, the site must be roughly contemporary with the Atlantic-Sub-Boreal transition. A further investigation of the site before it is entirely destroyed by the quarries is urgently needed for the implements which we have assembled here are not sufficiently varied to determine the character of the occupation more precisely.

Another, entirely different group whose tool complement was on the whole ill-suited to cope with forest conditions, may be represented by a small group of finds coming from the peat of the Trouille near Spiennes (fig. 32, no. 6) and illustrated in figure 34, no. 13. This group, also previously unpublished, contains some of the classical implements of the Tardenoisian, rectangular microliths (nos. 11 and 12), the round scraper (no. 10), the awl (no. 8) and that instrument peculiar to Belgian and Paris Basin Tardenoisian[4], the so-called "feuille de gui" (no. 9). But further, accompanying this normal Tardenoisian complement are tranchet axes such as no. 13, indicating that these folk, normally settled on sandy heath, here adapted to forest conditions. This

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[1]Althin 1952; Mathiassen 1948 (pl. 1, no. 6)

[2]Childe 1942.

[3]Van Giffen 1943.

[4]Daniel 1948.

situation is not unlike that revealed in the Horsham culture of southern England[1]. In this case, the heaths of the Obourg sands are less than three kilometers away, and it is not impossible that Tardenoisian settlers of this region foraged up the Trouille and left this trace of their passage.

We have several references[2] to Tardenoisian occupation of the Haine valley. In no case have we been able to find the implements in the collections. The first and, judging from the indications in the literature, the oldest group comes from Stambruges (fig. 32, no. 9) from the Grotte des Fées and is compared with finds from the Meuse caves by the discoverer. Here in the sandy heaths of the northern slopes of the valley, limestone outcrops provide shelters and, occasionally, caves which were probably used during the entire Atlantic period, and perhaps right down through the sub-Boreal. Another Tardenoisian assemblage from Obourg (or Mons) Beau-Val (fig. 32, no. 8) is recorded in the literature[3] as having numerous worked flints, some of which were struck on nuclei of Neolithic axes. This would tend to show that occupation of these poor sandy wastes continued on well into the period which was formally Neolithic on the forested slopes to the south. The two groups of people probably lived side by side right down to the early Bronze Age.

Sources of Material during the Mesolithic Period

The two main sources of flint in the area--Spiennes (and associated communes on the Spiennes-Ciply-Cuesmes-Flénu

[1] Clark and Rankine 1939.

[2] Habourdin 1883, 1898 (Stambruges); Rahir 1921 (Stambruges and Obourg); De Munck 1907; Dursin 1931; Rahir 1925.

[3] De Munck 1907. A similar situation existed on the surface at Zonhoven as Hamal 1909 noted long ago.

line) and Obourg--were not equally exploited during the Mesolithic period. The earlier finds, those of the Obourg-St. Macaire Hamburgian, the Mons-Beau-Val Maglemose, the Spiennes-Horsham, and the Stambruges Tardenoisian (according to the testimony of the excavator) are not in the more common Spiennes flint, but in the beautiful blue-white patinated Obourg variety. The Obourg deposits, first recorded by De Munck[1] and Rutot[2], probably outcropped near or along the banks of the Obroecheuil, but all traces of actual mining refer to the Neolithic period. The later sites at Bois Abrassart, Harmignies and, of course, the Obourg Tardenoisian using Neolithic waste as source material have flints of both Obourg and Spiennes flint. It is possible that the slopes of the hills at Spiennes were too covered with forest in the earlier period to allow the flints to be seen. Stream bed flint in the area, being in general unsuitable for blades, does not seem to have been used at all beyond the lower Paleolithic. The choice of Obourg flint by the earlier Mesolithic folk was probably also dictated by the fact that it is much more suitable for working into small blades than is the coarser flint of Spiennes.

The Campignian Question

We have not listed any sites in the area as Campignian, in spite of Nougier[3]. There are no assemblages of finds which occur outside of a Neolithic context, and usually a flint mining context at that, which have a

[1] De Munck 1886, 1886/7.

[2] Rutot 1886/7.

[3] Nougier 1950.

"Campignian" character with the possible exception of the Bois Abrassart. We cannot go as far as Gabel[1] and ascribe all the so-called Campignian to flint-mining waste, etc.; but it must be said that in a flint-mining region like the Haine valley, densely occupied (as we shall show in the next chapter) during the Neolithic period, it is impossible to separate any pre-Neolithic material out of the very long-lived types of the flint-mining tradition. Schwantes[2] long ago showed the vacuity of the Campignian attribution, and it is not our place here to enter deeply into the controversy. We shall discuss Gabel's[3] idea that the Belgian Michelsberg folk were themselves acculturated Mesolithic peoples in the next chapter.

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[1] Gabel 1957.

[2] Schwantes 1932.

[3] Gabel 1958.

CHAPTER VI

NEOLITHIC AND AENEOLITHIC SETTLEMENT OF THE HAINE VALLEY

Distribution of Sites

The occurrence of vast quantities of worked flint debris in the area around Spiennes led to an early interest in sites of the Neolithic period in the valley. As early as 1851, it was recognized[1] that the fabrication of Neolithic axes took place here on a vast scale. Finds of Neolithic objects in considerable quantities, not only from the area of the mines, led to the formation of several collections, and subsequent publication[2] of their contents served as an indication of the richness of the sites.

As early as 1875, in three simultaneous publications[3], local researchers described surface scatters of flint, clearly of Neolithic age, from the fields surrounding their homes. Similar descriptions appeared in the literature in 1878 and 1883[4], but it was not until 1890 that a serious attempt was made by De Loe and De Munck[5] to classify and map all of the archaeological finds of the lower two-thirds of the valley according to a standard scheme. De Munck did most of the field work, judging from later accounts[6], and added a considerable number of sites to those already known, especially in the northern and eastern part of the area. He supplemented

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[1] Tolliez 1848-1851.

[2] Tolliez sale catalogue, Mons 1866, reprinted in Schuermans 1890. Duvivier 1863/4.

[3] De Bove 1875; Lairen 1875; Lejeune 1875.

[4] De Bove 1878; Habourdin 1883.

[5] De Loe and De Munck 1890.

[6] Given me by Jean Houzeau de la Haie, (first cousin of De Munck and over 90 years old) who was able to give a quite lively account of the preparation of the map.

this research with several later papers[1] which gave an even more detailed picture of the sites along the Obroecheuil and around the Havré-Obourg-Mons area. Further papers by some of the other local researchers[2] rounded out a picture of several dense settlement areas, together with a host of minor ones. The southern slopes of the valley and the regions along the French frontier at its extreme eastern and western ends were mapped in the early part of this century[3]. Hence a fairly comprehensive picture was available when the author of this paper began his field work in 1955. Stray finds accumulated in the Mons and Brussels museums during the years intervening between the last published find maps of 1906/7 and the author's research also add to the over-all picture.

Gaps in research still leave some very blank areas in our distribution map (fig. 35). Noteworthy among these is the large area between the Ruisseau d'Estinnes and the source of the Haine. We have plotted only those finds and sites whose precise position is known; hence finds from this area in various museums having only the name of the commune attached are not included. The political difficulties inherent in conducting a survey, based and financed in Belgium, on the French side of the frontier also produced a large blank area at the extreme southern limits of the valley. However, since the density of finds thins out markedly as the southern slopes of the Mabeuge plateau is reached, the over-all picture is probably not seriously disturbed by this omission.

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[1] De Munck 1900, 1907.

[2] Habourdin 1898; De Loe 1907.

[3] De Pauw and Hublard 1901/2, 1902/3, 1906.

In our distribution map we have included not only finds such as polished axes, actual habitation sites or mines, etc., whose attribution to the Neolithic period is unquestioned, but also all of the surface scatters of worked flint whose types are roughly attributable to this period. There is of course no way of deciding the age of these surface scatters in other than a broad sense. Primary, of course, is the one-sided character of the finds, restricted to worked flint alone, for rarely do sherds survive. The possibility that a location was occupied at more than one period, leading to a mixture of finds, must also intervene in some cases for often the sites occupy positions of undoubted strategic advantage which certainly did not escape notice in many periods. But a further and more subtle complication emerges from the fact, which will be brought out later in this chapter, that the traditions of working flint in periods following the first Neolithic colonisation of the valley were extremely conservative and, hence, even a good selection of types from a surface scatter is no guarantee of age. It is highly probable, as Mathiassen brought out[1] in an exhaustive survey of Vendyssel, that some of surface flint sites belong to the fully-developed Bronze age or even to later periods. The paucity of middle and late Bronze age finds of definite attribution in the valley[2] tends to lead us to believe that the "Bronze Age" settlement was in essence a lingering late Neolithic tradition, uninterrupted until Iron age times. Hence our map reflects too this late "Neolithic", even though other parts of

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[1] Mathiassen 1948b.

[2] Restricted to the late Bronze age hoard of socketed axes from Montignies-sur-Roc (Schuermans 1890, with refs.) and certain finds from Spiennes, possibly also a founder's hoard (Marien 1953).

Belgium more nearly in the mainstream of European prehistory passed on to higher developments.

The distribution of worked flint per se is not a guide to the Neolithic settlement for, in a region of abundant, easily-worked material, it seems unlikely that poor people, even after the Iron age, would have neglected its possibilities. However, the quality of flint working practiced casually after the Bronze age did not lead to the production of the normal Neolithic types, especially long blades whose production required a considerable degree of skill. Hence, by restricting our selection to those sites which produce typical "Neolithic" objects, we hope to exclude scatters of very much later times. One aspect of later distribution is of some interest. The people resident in the Haine valley in Roman times seem to have shown some interest in flints, perhaps as curiosities. Neolithic axes have been found accompanying the normal grave goods in several of the burials from the Roman cemetery at Haulchin[1].

The distribution of the finds is strongly influenced by the enormous concentration of waste material in the vicinity of a series of flint mines which stretches in a great semi-circle with a radius of several kilometers south and east of Mons. This waste material tends to obscure a number of important sites which would otherwise have passed unnoticed, but which, thanks to air photography, have now been recorded.[2]

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[1] Unpublished, in the reserves of the Mariemont museum.

[2] Scollar 1955.

The majority of the scatters tend to be on high ground, not far from an easily available source of water. This seems logical from a strategic standpoint and is almost the exact opposite of modern settlement which is concentrated in the valleys themselves. However, this hill top distribution should not be too literally interpreted for a number of totally unrelated factors intervene and perhaps force the phenomenon. Erosion is greatest on the hill tops and upper slopes[1] and this tends to wash out the lighter loess which covers most of the hills, eliminating all traces of structures which did not penetrate deeper geological layers, leaving the relatively heavy flint exposed or near the surface. Deep ploughing, especially in those areas where the farms are large enough to employ tractors, has been responsible for turning up a considerable number of these sites in the last few years. Furthermore, the loess which washes down the hills tends to cover any sites which may lie in the hollows with a very considerable thickness of recent deposit, reducing the likelihood of their discovery. The modern valley settlements, most of which date from early medieval times (though some perhaps go back to the early Roman or even the Iron age), themselves occupy some of the most suitable locations and may mask earlier occupation.

Throughout the lower half of the center of the valley, the Haine flows on an alluvial deposit which itself overlies a very considerable thickness of peat. From time to time Neolithic flints, axes, bone tools and

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[1] See Chapter I on altiplanation.

the like have been reported from the surface of the peat-alluvium junction, and it would seem likely that the alluviums themselves begin with the Neolithic deforestation of the slopes. A group of very large wide-butted axes belonging, as we shall see, to the earliest period of Neolithic occupation and stained a dark brown from prolonged submergence in the peat was found many years ago at Quaregnon[1]. Similarly, finds of axe haftings have also been reported as coming from a like context near Mons itself[2] and from Thulin near the hamlet of Sardon[3]. To the best of our knowledge, the Haine peats unfortunately have never been investigated with modern methods, but such a study in hand when future finds are made would be an invaluable adjunct to solving some of the chronological problems which we will soon discuss. Unfortunately again, there is no reason for the exploitation of these peats since they lie under such a thick alluvial layer in a region where cheaply mined coal has for long been the basis of the economy. Finds occur by merest chance during the cutting of foundations, wells, water mains and the like. In such cases, proper sections and exact positions in the peat are seldom available.

Particular concentrations of surface scatters often mark the location of important sites. Naturally, those around the flint mines[4] are an obvious example. Others reflect important occupied sites, some of which have been excavated. In the Caillou-qui-Bique near

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[1] Mons Museum, no numbers; MRC ref. De Loe 1928, p. 207; Duvivier 1863/4.

[2] Tolliez sale catalogue 1866.

[3] De Bove 1878. Fig. 35, no. 147.

[4] The Spiennes group, fig. 35, nos. 16-20, 29-37, 101, 102.
The Ciply-Cuesmes group, nos. 8 and 9.
The Obourg-Obroecheuil group, nos. 112-118, 132-144.
The Nouvelles group (related to the Spiennes finds) nos. 21-27.
The Flemu group, nos. 2, 4, 100.

Angré-Roisin just such a concentration occurs[1], and excavation has revealed[2] a settlement which we shall attribute to the Aeneolithic on the basis of the coarse flat-bottomed pottery which it contained. Similar concentrations lie on the hills north of Havay[3], in the region between Quevy and Goegnies-Chaussée[4], south of St. Symphorien[5], north of Elouges[6], along the Trouille south of Givry[7] and perhaps around Stambruges[8] and on the French frontier west of Rouveroy[9]. Of these, only the St. Symphorien and Givry-Trouille concentrations have at one time, in one way or another, been excavated. The St. Symphorien sites have yielded Michelsberg pottery of which more later, and the Givry site[10] has furnished a few sherds which we will attribute to the Aeneolithic. At this last, a possible Roman barrow has been constructed with earth taken from the settlement, and the finds were made during the excavation of the barrow. The particular surface concentration, here and elsewhere along the left bank of the Trouille, is unusual compared with the right bank, and this condition extends as far as the junction of the Trouille with the Rivière de Nouvelles[11]. The reason for this appears clearly in plate 4, a composite air photo which shows part of the region between Spiennes, Harmignies and Nouvelles. The Trouille meanders in an S-shaped arc from the lower right hand corner of the picture to the top center. To the

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[1] nos. 164-186.

[2] De Pauw and Hublard 1902/3.

[3] nos. 77-84.

[4] nos. 68-74.

[5] nos. 53-65.

[6] De Bove 1873, 1878; all points included in no. 148.

[7] nos. 95-98. [8] nos. 105-107, 187-192. [9] no. 90

[10] Houzeau 1953b [11] Colman 1957 has remarked on this.

north (top) lies Spiennes, to the southwest, visible in the lower left hand corner, lies Nouvelles and to the east, partly visible in the lower right hand corner, is Harmignies. We have marked as no. 8 in this photograph a peculiar crenelated crop site, clearly a fortification, which parallels the Trouille, at a distance of several hundred meters, keeping to the high ground. This crop site is visible in photos to the south as far as the French frontier, some 7 kilometers away. It is the remains of a 17th century earthwork constructed for the siege of Mons in 1694 by the troops of Louis XIV to hold the line of the Trouille against Spanish reinforcements[1]. At one point, in a little wood west of Harmignies just outside the lower portion of the photo, the bank and ditch still survive to a height of about three meters and a depth of perhaps the same. The crop site shows the dark line of the ditch quite well and in places, especially where the underlying chalk has been cut, the white line of the bank, often spread over quite a large area through subsequent ploughing. That such a fortification would disturb quite a number of sites of various periods is not surprising, and it accounts for the concentration of surface finds on the left bank of the Trouille. The Givry sites, the Nouvelles finds, material south of Harmignies, and a number of other points owe their identification to its construction.

Plate 4 also clearly shows a railroad line running from the upper left to the lower right of the picture, and point 3 marks the position of the famous Spiennes trench where the shafts of the Neolithic flint mines were first

[1] Mapped quite conveniently in Beaurain 1776, Vol. 5, pl. 2 and 3, who gives the relevant information concerning its construction. The presence of several gun positions is nicely visible at 6 points in our photo.

observed in the profile. Point 2 marks the eastern section of the Mesvin trench where finds referred to in previous chapters were made and where, according to reports[1], a Neolithic occupation was also disturbed. The flint mine shafts themselves give quite good indications in the photograph, appearing as dark spots on a gray field, though they are best seen with magnification on the negative or in a great enlargement. Such mine shafts appear in considerable numbers at points 5, 6, 12, and at point 1 is the white chalk heap of the dump from a recent excavation[2]. Other items of interest in this group of photos are points 4 and 7, one a double-ditched enclosure, the other single-ditched, which we will discuss in the next section. Point 9 shows remains of some regular structure, which a search of the literature shows to be the location of a number of 1st-century Roman graves with stone construction[3], and point 10 marks the location of a large Frankish cemetery, excavated at the end of the last century[4]. The area around point 5 is the famous Camp à Cayaux.

Flint mines at Ciply, the "Trous des Sarrasins", long ago reported[5], have for the most part been destroyed by quarrying, but a few still survive outside the area noted in the literature. They are quite visible on the air photo of pl. 6 where they have been circled to show the locations more precisely. Also visible in the photo is a Roman villa, previously unrecorded, confirmed by surface finds of pottery and mentioned here for the sake of completeness.

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[1] Cornet, Briart, Houzeau 1872.
[2] Le Francq and Moisin 1955.
[3] Now in the Mariemont museum.
[4] De Loe 1928, vol. 4, with refs.
[5] De Loe and De Munck 1890; Cornet, Briart, Houzeau 1872.

An interesting situation is revealed in the air photo of the sites on the French frontier west of Rouveroy,pl. 5. This is one of the highest parts of southern rim of the valley and has obviously been used strategically for some time. Easily visible in the photograph is the outline of the great Dark Ages earthwork known as the "Castelet" of Rouveroy, excavated at the beginning of this century[1]. It is of two periods, as evidenced by the inner bank and ditch which divides it into two halves,the inner bank being interrupted by two gateways. A number of stray Neolithic finds, probably unearthed during the construction of the earthwork, were found mixed with the Dark Ages sherds and with some La Tène sherds from an earlier occupation on the spot. In Roman times a marching camp was probably established on the hill at point 3, where the curved corner is just visible. The field boundaries still partly respect the line of its bank and ditch. But a still more interesting site is at point 1, where both Hublard[2] and the author found considerable quantities of worked flints, for there is another trace of a double-ditched enclosure related to the type seen in plate 4. The late Neolithic sites along the Trouille, here too disturbed by the 17th century earthwork just visible at the extreme left of the photo, were probably connected with this earthwork judging from the uniformity of the finds. The flints are partly in the common Spiennes variety and also in a less used Turonian sort known locally as the "Silex des Rabots" which is not commonly encountered in sites of the region.

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[1] De Pauw and Hublard 1906.

[2] Map of finds accompanying De Pauw and Hublard 1906.

The author, in making the survey of the valley, was obliged to restrict the examination of air photos to the regions of maps 45/7 and 8, 51/3 and 4 of the grid of the Carte Militaire[1]. Most of the sites found can be referred

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[1]Full list of photos examined (limits shown in fig. 35 by solid lines):

German (Luftwaffe): series made for J. Werner in June 1940 covering all of the Roman roads of Belgium, now in the archives of the RGK, Frankfurt. Scale about 1:15000.

Belgian Military: made 5/6/52; 1:20000, nos. 10136-10250 for sheets 45/7 & 8, 51/3 7 4.

Belgian Civil (Service de Topographie et Photogrammetrie, Ministere des Travaux Publiques): all 1:5000 or 1:7500:

239J, 240A,B,C, nos. 8682-8697, 8698-8724, 8725-8752, 8753-8769
233A, 5689-5706
233B-E, 5708-5786
233F-M; 234A-E, nos. 6075-6149
234G-I, 6128-6264
231K, 232A, nos. 5252-5324
227APG, BPP, CPG, nos. 2633-2685
154 C-F, 8949-8996
155 A,B, 8997-9034
129 A,B,C; 130 A,B,C, 3490-3681
17 A,B,C, 9346-9507
17D; 18 CA, 9711-9876

At 1:10,000:

Flights 23 A-E, 8 A-E, all within 45/8, 7, on 28/5/54 (350 photos); repeat flights, same strips on 9/5/55 (about 200 photos); repeat flights of same strips on 28/6/57 (about 200 photos), each strip comprising about 35 photos, 60% overlap.

Flights Roisin 14, 15, 16 on 9/5/55 covering area of 51/3, 4 (about 105 photos).

All photos considered (about 1800 photos in all) were examined during a 9-month period from October 1954 to June 1955 and occasionally on subsequent dates for later flights. A span of about 17 years, with exceptions of the war years, has some cover for each year and at all possible times of the year except winter. Total cover for the area was available on two independent occasions and nearly total cover on three others.

A further series of photographs of the Roman road system, made at the request of the Service des Fouilles on 16/5/56, was also made available to me by the Ministry. These were made shortly after a rainy period and proved of little value.

Of all photos examined, only those of flights 23 A-E on 28/5/54 and Roisin 15 proved to be of great value. The others were made either at the wrong time of the year, in improper conditions of light, or in insufficiently dry weather. The total number of worthwhile photos thus was

to periods later than the Neolithic, but often disturbances of the ground due to activities of later periods, including two world wars, produced quantities of finds on the surface. These disturbances were, like the 17th century fortification, easily visible on the photographs and, when investigated in the field, produced most of the sites which we have listed as "Survey Finds" in the catalogue accompanying fig. 35.

Mode and Form of Habitation

The only habitation area in the valley which has been subject to repeated excavation[1] is that located in and around the flint mines at Spiennes. Even here, it is clear that the village or permanent domestic site has not yet been found, but enough is known from the character of the finds to be reasonably certain about certain aspects of the mode of life during the Neolithic and Aeneolithic periods considered as a whole.

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footnote continued from preceding page:
reduced to 100 or so which, with 60% overlap, actually reduces to 40; and, of these, only about 12 had sites of some interest. Thus, the percentage of useful photos among all those examined was roughly 0.67%, a very small fraction when it is conceded that it requires almost as much time to examine a photo containing little or no information as it does for one of great value.

[1] A partial list: Breuer 1930; Cody and Lefort 1953 (unpublished); Cornet, Briart, Houzeau 1872; De Loe and De Munck 1889; De Loe 1913, 1920, 1925, 1928; De Loe and Rahir 1929; De Munck 1887/88; 1889; De Pauw and Van Overloop 1885/1886, 1889; Hamal 1925; Houzeau 1953a; Le Francq and Moisin 1955; Rahir 1928; Tolliez 1848-51; Verheylewegen 1953-57 and the numerous unpublished digs of Charles Stevens of Spiennes who has made a livelihood from his efforts over a 40-year period. None of these excavations, with the possible exception of that noted by Le Francq and Moisin, can be said to have been properly conducted, planned or published. The above accounts represent only part of the history of the pillage of one of the most important archaeological sites in Belgium.

It is clear from finds of grain-imprinted pottery[1], remains of burnt clay walling with grain imprints[2], etc., that the inhabitants cultivated several of the common cereal grains, perhaps including spelt, wheat and millet. The presence of grindstones and flint sickles further testifies to the presence of organized agriculture.

Animal husbandry also played a role of considerable importance, and remains of goat, sheep, pig and, above all, cattle have been identified among the traces of occupation debris. However, considerable quantities of bones of wild game, amounting to nearly a third of the total found, indicate that hunting was not unimportant as a source of food. There is no evidence for fishing, but this is less likely to survive.

All of this points to permanent settlement and not to periodic visits to the flint mines by far-flung groups, as some authors have implied recently[3]. No traces of houses have been discovered during the 70 years of excavations at Spiennes, but this is not all to be attributed to faulty excavation technique. On the left bank of the Trouille, few excavations have been carried out. The soil cover here is thick enough to permit discoveries of structures to be made, but it is very strongly lehmified in places, and this may prevent identification of all but the bottoms of rubbish pits. The right bank, the "Camp à Cayaux", has a very thin soil largely made up of dissolution products of the underlying

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[1] Noted in Appendix and further in Marien 1952a, De Laet 1958; these imprints have never been adequately studied by a competent paleobotanist.

[2] According to Breuer 1930.

[3] Verheylewegen 1957.

chalk, strongly lehmified. Only the most careful technique might be expected to find traces of post holes etc. in this situation, even if the holes were cut into the chalk itself.

The utilisation of partially-filled mine shafts either as ateliers or as rubbish pits has been attested in nearly all reports. That some sort of temporary shelter would be required can be easily appreciated by all who have spent any time on the site in windy weather. The reports of "fonds de cabanes" are another matter. Shallow pits, ranging from 2 to 5 meters in diameter, filled with blackish occupation debris, sherds, etc., have been found at least to the number of 125 in considering only those whose finds are preserved in museums and not counting those privately or illicitly excavated. These pits, not all of which can be counted as rubbish disposal areas, might with satisfactory excavation produce interesting results. In no case do we possess a well-executed plan or section of a considerable area containing them. Nor, for that matter, do we have a satisfactory section of any of the mine shafts which produced occupation debris. These shafts have parallels in the British flint mines[1], and it is not at all unlikely that occasional meals were taken on the site. One author has suggested that the miners emerged from their work at lunch, which they took in the nearest available partially-filled pit. This is not unreasonable, and would produce a characteristic short term deposit which has actually been found on two occasions[2].

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[1] Piggott 1954, p. 40.

[2] In our fig. 37 middle right, taken from Cornet, Briart, Houzeau 1872, and in Houzeau 1953a.

At least two authorities[1] have suggested that the village attached to the Spiennes mines lay not on the hill with the mines themselves but in the marshes of the Trouille some 2 kilometers to the north. This idea is based largely on the attribution of the mines to the Michelsberg culture which is supposed to have preferred low marshy sites. It derives from the discovery of Michelsberg settlements in north Switzerland in just this situation. However, we will show in chapter VII that the Belgian Michelsberg does not share many features with the Swiss group and, in fact, derives from the Rhineland. In areas to the north of Switzerland, only a very few Michelsberg settlements have been found on low-lying ground. Most are located on modest hill tops and are very frequently fortified. The Trouille marshes are not absolutely ruled out but their probability as a habitat is diminished in view of the foregoing and in the absence of finds. Greater likelihood lies in one or the other of the circular ditched enclosures which we have noted on pl. 4 (neither in excavated areas) or on the hill of Mt. Panisel-Bois de Mons to the north which has yielded enormous numbers of finds. Unfortunately, the heavy woods have made it impossible to see anything there on the air photos, and would render excavation very unpleasant.

The third ditched enclosure at Rouveroy, pl. 5, with its strong concentration of worked flint, tends to support the conclusion that fortified hill top camps were the more likely mode of habitat, especially since the concentra-

[1] Breuer 1930 and Colman 1957.

tion lies outside the flint mining area on Devonian sandstone with loess cover. However, the rarity of these enclosures in the valley as contrasted with the large number of surface scatters of worked flint makes it unlikely that this form represents the only situation. Rather, the enclosures look like constructions erected for some very special and infrequently required purpose.

None of the three sites which we have found have been tested by excavation. Therefore, we cannot be sure that they belong to the Michelsberg phase of occupation. Indications given by the surface finds at Rouveroy point to the types of flints which we will ascribe to the late Neolithic and, hence, to an occupation later than that of the Michelsberg colonisation. The Spiennes sites cannot be judged on the basis of surface finds for the soil is so filled with mine debris that no analysis is possible in the absence of well-stratified pottery. As refuges, however, they may well represent Michelsberg constructions built not at the beginning of that occupation but at its end which, as we shall show, was at a very late phase in the Neolithic, parallel with a fully developed SOM-like culture. They may thus represent unsuccessful defenses against this intrusion.

There is little evidence to suggest that the enclosures at Spiennes or at Rouveroy have a multiplicity of entrances. The author has carefully examined the air photo negatives—which under magnification give much greater detail than do the positive prints—and no traces of interruptions in the ditches can be seen. As we have seen, there is little evidence for seasonal occupation of the Spiennes mine area, and there is no reason to apply the term

"causeway camps" to these enclosures. The use of the Belgian chalk lands as open pasturage along the lines suggested for the British chalk downs[1], with consequent need for cattle enclosures used at periodic roundups, seems unlikely in view of the heavy loess cover which we know to have supported a thick Oak-Hornbeam forest during the climatic optimum. Deforestation at the beginning of the Neolithic occupation was carried out as we have shown in the previous section, but this probably did not result in more than limited clearings. There is strong evidence that the forest cover over the greater part of our area was not completely removed until early medieval times[2].

A fortified enclosure at another site of the Michelsberg culture in Belgium has been claimed for Boitsfort, near Brussels[3]. We have dealt with the question in a recently published article[4] and, after making a careful examination of the air photos of the site together with a contoured terrain map, are led to the conclusion that the visible remains are to be attributed to erosion

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[1] Piggott 1954.

[2] This can be seen in the full air cover of the region. Modern field boundaries run parallel and at right angles to the three great Roman roads which cut through the valley at the lower (Bavai-Boulogne road), middle (Bavai-Asse road), and upper southern (Bavai-Cologne road) sections of the area. That they follow the Roman centuriation seems unquestionable. But this situation only obtains in a limited zone about a kilometer and a half wide on each side of the road; then the crazy-quilt pattern based on the medieval field system begins. Hence, it may be assumed that the limit of the two field systems represents the boundary of cultivated land at the end of Roman times. This is in itself a small proportion of the total valley area, and it may be assumed that, in the limited conditions of Neolithic occupation, the open country was even less extensive. We have not dealt with the documentary evidence for the degree of aforestation in Roman times in the area, but it leads to a similar conclusion.

[3] Jacques 1899/1900; Vincent 1910; Rahir 1928; De Loe & Rahir 1924

[4] Scollar 1957.

of the hollow ways of a medieval track which mounted both sides of a little spur of land between two brooks, and through further soil slip. It is not impossible that some sort of defensive earthwork existed at this and at other Michelsberg sites, but the visible evidence at Boitsfort cannot support the claim. The old excavations which were made by means of small narrow trenches were not adequate for the solution of the problem.

The general tendency to fortify the late Michelsberg sites in the Rhineland (see Chapter VII) leads one to believe that the Belgian colonists who derived from that group may well have done the same. However, the fortification in the Rhineland took place at the end of the Michelsberg occupation, as we shall attempt to show in Chapter VII, and there is some evidence to demonstrate that the settlement form in this group was at first undefended. It is likely that the Belgian group which probably encountered no hostile autochthonous population on its entry was not constrained to fortify its settlements until the arrival of SOM-like groups from the Paris Basin very late in the Neolithic period. The ditched enclosures of the Rhineland are quite clearly defensive earthworks and only incidentally cattle camps as Roder has recently shown[1]. Terminal dating for Urmitz (which owes its enormous size to the opportune use of a dead arm of the Rhine as a ditch) is given by a beaker arm shield from the bottom of the inner ditch, and Mayen-Katzenberg from Schnurkeramik sherds in a similar position[2].

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[1] Communication to Prehistoric Congress 1958.

[2] Bonn 14007, mentioned in Lehner 1903; and Mayen-Katzenberg in Lehner 1921.

A similar tendency to fortify habitation sites at the time of the great disturbances represented by the rise of the various beaker, corded and SOM cultures is also apparent in central Germany where, at the Hutberg, a Schnurkeramik barrow is built over the ditch shortly after its construction[1]. At the Beusterberg, too, Tackenberg notes[2] that the so-called Michelsberg sherds lie on the old surface of the site, covered by the bank, prior to the construction of the earthwork. Schnurkeramik sherds are found in the ditch and more "Michelsberg" sherds lie on top of the bank, probably thrown up there during much later reconstructions of the defenses. Other evidence for Michelsberg fortification, at Munzingen, points to a very late date[3]. The only Michelsberg fortifications which belong to an earlier phase of the culture are those at the Michelsberg itself[4] and at the Goldberg[5].

There are great chronological objections in relating the Belgian to the British camps, as well as the economic ones which we have raised previously. Some of the very easternmost of the British camps such as Whitehawk in Sussex[6] have gates and a palisade, but it is said to have pure Windmill hill ware in the lowest levels of the ditch. Combe Hill[7], a site with Peterborough ware in the ditches, may be more directly comparable with our Belgian examples, but then its character as a fortification is in doubt. From this,

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[1] Benesch 1941; Grimm 1958.

[2] Tackenberg 1951.

[3] Maier 1958 with references.

[4] Where the ditch was probably constructed in defense against the early Schnurkeramik invaders of north Baden.

[5] Where the ditch was probably constructed in defense against late Altheim invaders of eastern Wurttemberg who successfully captured the site.

[6] Ross-Williamson 1930; Curwen 1954; Piggott 1954.

[7] Musson 1950; Piggott 1954.

it may be concluded that the evidence does not permit us to link the Belgian sites with the British. A recent excavation in the Charente[1] has shown that a fortified enclosure with double bank and ditch occurs with younger Chassey unornamented pottery in primary positions and that the site continues in use until the time which produced the flat-based "flower pots" typical of the Vienne-Charente facies of SOM. If our Belgian sites do have western origins, then this last example may be involved via similar but highly hypothetical sites in the Paris Basin.

Mines and Mining Technique

We have stressed flint mining as one of the bases of the economy of the Haine valley in Neolithic times, and we shall now examine that aspect in greater detail.

The geology of extraction cannot be discussed in relation to the Obourg, Ciply, Cuesmes or Flénu mines but for Spiennes we have the admirable section provided of the left and right banks of the Trouille by the railroad (see pl. 4, no. 2). On the right bank, mine shafts were not intercepted by the trench, but the section of the chalk-bearing seam is much clearer. We reproduce it here, figure 36, top. The chalk or, more correctly chalks--for there are four of them--are all Senonian deposits. They are inclined downwards towards the northwest in flat sheets of varying thickness due to subsidence in the primary valley syncline near its center. The strain of subsidence has produced repeated faulting,

[1]Burnez et al. 1958.

easily visible in our section, and this gives rise to discontinuities in the seams of flints sought in Neolithic times. The flint seams occur in the Spiennes chalk which forms the top of the sequence and also in the Obourg chalk which is separated from it by the flintless Nouvelles chalk. The Obourg chalk lies on the Trivières chalk which also lacks flint. Because of the inclination of the strata, the upper chalk outcrops all over the surface of the Camp à Cayaux and on the edge of the left bank of the Trouille. As we have pointed out earlier, it is not certain that the flint outcrops on the upper plateau were visible in Neolithic times but those along the stream boundaries certainly were[1].

The Spiennes section, famous in the literature[2] and oft reproduced, is here again presented with modifications, fig. 36, middle top. A series of open workings mark the surface of the outcrop on the right side of the cutting, and pits grow deeper, extending into shafts, and ultimately branching out with galleries as the desired stratum plunges downward. It seems not unreasonable to suppose that the open workings were earliest and that the shafts and, ultimately, the galleries were later. Faulting is less on the left bank of the Trouille so that this development is quite regular whereas, on the right bank--the Camp à Cayaux--the mines descend to definite but different levels in different parts of the plateau. The time elapsed between these varied stages need not have been very great for it has been shown that the time required

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[1] Curwen's suggestion (Curwen 1954) that it is possible that the flint seams were found in digging the ditches of camps seems unnecessary at Spiennes, where the Trouille conveniently bisects the deposits.

[2] First shown in Cornet, Briart, Houzeau 1868, then 1872 and reprinted many times since. Incorrectly identified as a section of the Camp à Cayaux, right bank in Marien 1952a.

to sink a shaft and exploit it was not very great, considering the time scale of our chronology. We shall return to this.

On the right bank, the shafts have very little overburden to work through and engage the chalk almost immediately. Hence, they can reach considerable depths (up to 20 meters in the northwesternmost portion) without danger of cave-in. On the left bank however, as our section shows, the western ends of the hill bore a very considerable thickness of Quaternary deposit which we have discussed in Chapter III. These deposits, largely of sandy loesses and gravels, are inherently more stable than might be thought, sections up to 10 meters in height remaining quite intact in quarries nearby after years of exposure to the elements. They must have been relatively easy going for miners who were able to cope with 20 meters of chalk. The visitor to the cleared mine on the left bank[1] enjoys no great feeling of security despite the secure wood and brush shaft supports which the excavators have provided. There is no evidence that any method was used in the left bank mines in prehistoric times to prevent shaft collapse.

The left bank shafts, though discovered earlier[2], have been overshadowed by those on the right bank where many of the numerous excavations listed in the first part of this chapter have been carried out. The right bank shafts are more readily visible on the surface because of the slight depressions in the turf overlying them. They were excavated nearly 20 years after the

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[1] The excavation of the Société de Recherche en Prehistoire de Hainaut (see Le Francq and Moisin 1955).

[2] Suspected by Tolliez 1848/51; observed by Malaise 1866, though incorrectly interpreted; and confirmed in 1867 with the cutting of the Spiennes trench.

discoveries on the other side of the river[1]. The galleries here, due to the greater thickness of overlying chalk and the more productive flint seams, reach very considerable proportions, often merging into underground chambers of considerable lateral size though restricted in height to a little over a meter. Illustrations of these more spectacular workings have often been published[2], but it must be remembered that they represent the character of the workings only in the most difficult conditions. On the whole, the shafts tend to average about 8 meters deep, and the "galleries" represent mere enlargements at their bases. The cutting of the galleries followed no definite and planned idea, and it is evident from those sectioned in figure 36, middle right, that the miners had not the slightest comprehension of the sloping horizontal stratification. Having come down through the overburden, they encountered and used a desirable seam. Then they continued downwards and, finding nothing, worked up again, re-encountered the seam, worked it horizontally and lost it again. Then they made two forages upwards where they then encountered the overburden and abandoned the gallery, though usuable material lay near at hand. Similar phenomena have been seen in other galleries. There is little evidence that they worked the flints from underneath[3], a concept which is based on a false interpretation of this cutting. It seems likely that the working qualities of the flint were well appreciated and understood, and the shafts and galleries were driven until flint of desired quality

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[1] De Munck 1887/8.

[2] The usual photo is in De Loe 1928, and we will spare our readers its reproduction here.

[3] R. Clarke 1935.

was reached. When faulting intervened or the flint seam was otherwise interrupted, the shaft was abandoned and a new one was driven as close as possible to the old, as Piggott has pointed out[1], in hope of finding the desired flint again. A similar haphazard system was observed in the Danish mines[2] where perfectly good seams were mined from two sides without the galleries meeting.

There is some interest in determining the extent of the mined area. Since the shafts are easily visible as dark spots in the air photo, some attempt can be made to estimate their number. This is a difficult procedure because of several complicating factors. First, we cannot be certain which dark spots to attribute to natural pockets of dissolution of the underlying chalk. Secondly, the annual crop rotation cycle in the area is one of five years, and only those shafts which lay under fields of wheat photographed after the dry spell of May 1954 are reliably visible in the photos at our disposal. Also, the numerous excavations made by local and other archaeologists have certainly contributed a substantial number of holes which may appear in our photographs. Rahir alone reports[3] making over a thousand sondages of about two by one meters in size. Then, too, the heavy overburden on the left bank reduces the sensibility of the overlying crop to the effect of the shafts, though this effect is not as significant as the others.

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[1] Piggott 1954.

[2] Grantzau 1954.

[3] De Loe and Rahir 1929.

We arrive at the total of nearly 2,000 shafts as follows: the negative of the air photo, which is reproduced as plate 4, was viewed under 20 power magnification. The number of visible spots was multiplied by 5 to allow for crop rotation. The dissolution pockets were allowed for by counting and subtracting spots (about 10 per hectare) on a sample area of the Harmignies cuesta where mines are known definitely not to exist. Finally, the area of about 25 hectares under permanent pasture which is the most excavated portion (and a national monument) was not used in the counting process, but an average value of pits per hectare (20) was substituted in its place. The mines at Ciply-Cuesmes, some of which still survive (pl. 6), yield, by the same method, about two hundred more. The area of the known but destroyed mines is included. Those of Flénu, which are not visible on our photos because of modern tip heaps, probably were on a smaller scale and can be neglected. This is nearly seven times the number reported[1] from Grimes Graves, possibly the next largest group of flint mines where the shaft and gallery technique was employed. However, it has also been estimated roughly that 9 men working casually could have managed to produce the Grimes graves total in 200 years. This is a very conservative estimate, for it has been shown[2] that the shafts were certainly sunk, exploited and filled in less than a year at Spiennes. This observation is based on the fact that Spiennes flint takes about a year to begin to acquire air patination, and none of the flints or wasters in the

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[1] Clark 1952, who also makes the estimate which follows.

[2] De Loe and De Munck 1889.

galleries of the mines are so patinated. From considerations which will be brought out shortly, we consider that the mines were first exploited in Michelsberg III (see Chapter VII), heavily exploited in Michelsberg IV and in ensuing Aeneolithic times; and further use continued on a diminishing scale down to the time of the late Bronze age founders hoard mentioned in the previous chapter. Using the chronology on which we base our date Michelsberg III at 1900 B.C. and taking the founders hoard as dating circa 650 B.C., it is not astonishing to find over 2,000 pits in the area, even assuming of course that the number dug in later years diminished sharply. When, too, we consider the vast quantities of worked flints and axes found not only in the Haine valley but all over western Belgium and part of northern France which have their source in these mines, and allow for the probability that what has been found so far represents a tiny fraction of the total, it is not so surprising to find an exploitation of this size. Piggott has noted that "The mines and factories seem unlikely to be the result of even regular seasonal visits by agricultural villagers, for not only the high degree of mining skill shown by the galleried shafts, but the individual and economic process whereby axes were flaked from the rough suggest rather the work of full time craftsmen...."[1] The extent of the effort at Spiennes and the surrounding mines points to the same conclusion. Other mines in the area are, as pointed out, rather less known than those of Spiennes. The extraction of Obourg flint was, according

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[1] Piggott 1954, p. 36.

to De Munck[1], conducted by trenching--3 meters deep, 5 long, 6 wide--and the beginnings of galleries were observable and rare shafts noted. In all, 8 pits were seen, and an atelier 150 m. south furnished nuclei, blades, wasters, convex end-of-blade scrapers and similar blade tools[2]. Obourg deposits were reserved for blades only, the flint being unsuitable for axes. No pottery has ever been found but a two-piece antler rake, similar in type to those used at Spiennes, was discovered. This is our only direct indication that the mines are roughly contemporary. Indirectly, it is indicated by joint finds of both Spiennes and Obourg flint in a number of the Neolithic sites in Flanders. Obourg flint, as we have noted in the previous chapter, was utilized casually during most of the Mesolithic period as well, but it is hardly likely that any mining was carried out in the true sense.

Obourg also provides us with one of the few but oft-illustrated examples of a prehistoric mining disaster. The miner cut under the base of a shaft, or more probably of a chalk dissolution pocket filled with mobile material, and was buried in the subsequent fall[3]. Subsequent finds of other miners have been reported from Obourg and Strépy[4] but these are probably forgeries since they were sold to Rutot by Dethise (see Chapter III, last section). Much has been made[5] of the fact that the Obourg miner is dolichocephalic, and two of the Spiennes casual

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[1] De Munck 1886.

[2] De Munck 1886/7.

[3] De Munck and Houzé 1891.

[4] Rutot 1905; Houzé 1906.

[5] Marien 1952a.

interments are brachycephalic. It seems unlikely that one can draw significant conclusions from so restricted a sample.

At Flénu, Cuesmes and Ciply, we know very little. Seven pits were sectioned by the Mons-Dour railway at Flénu and, judging by the description[1], these were of a type contemporary with Spiennes. At Ciply, the site was long known, even in medieval times, and bears the place name "Trous des Sarrasins", it being the local custom to ascribe strange and mysterious man-made features of the landscape to the Saracens. Today, all but a few pits have been quarried away and they, too, will disappear soon. No finds other than the usual axe factory debris have been recorded.

A great deal has been written concerning the age of the flint mines in various parts of the North Sea-Baltic Cretaceous belt. At Spiennes, it rarely has been suggested[2] that the mines were anything other than Neolithic in origin though, in our opinion, some Belgian authors assign them a far too early date in that period. We think that the basic exploitation using pit and trenching technique began in the earliest phase of Michelsberg occupation which is visible in Belgium, our phase III (Chapter VII), and perhaps the deeper shafts were begun by the same people shortly afterwards. The tradition continued, with the greatest exploitation towards the close of Michelsberg times at the end of our phase III and the

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[1] In Cornet, Briart, Houzeau 1872.

[2] De Laet 1958--assertion of "Pre-Campignian" flint mining in the Liège area is unproved. The archaic aspect of mine debris has long been recognised as of no significance.

beginning of phase IV. The later occupiers of the site in the Aeneolithic almost certainly continued to work the mines in the traditional way. The pottery which we can assign to Michelsberg does not of course come from mine shafts. It comes from pits, partially-filled shaft openings and the like, but the volume of finds is such as to make it unlikely that the occupation antedated the shaft mining to any extent. Much the same evidence obtains for the Aeneolithic phase of work though there is far less of it, and still less for the later periods.

Any exaggeration concerning the beginning date of the mines is easily dispelled by an examination of figure 36, bottom left, where it can be seen that the shaft cuts right through the brick earth and is lost in the modern humus. This indicates that the shaft must post-date the complete formation of the brick earth. But, as we have brought out in earlier chapters, this formation which began during the climatic optimum was not terminated until the forest cover was destroyed; and that took place during the fully-developed Neolithic. Hence, arguments concerning a possible "Campignian" pre-Michelsberg origin are without a basis, at least with regard to the shaft and gallery technique. Moreover, no pits or trenches are overlain by undisturbed brick earth.

The old observation[1] that two ateliers lay one above the other on the hillside, the upper containing polished material, the lower unpolished, has been seized upon by some[2] to imply that the mines had a "Campignian"

[1] De Pauw and Van Overloop 1889/90.
[2] Notably Nougier 1950.

beginning. Later, it was shown[1] that the same condition could occur with two ateliers containing unpolished material. Polishing is rare in the ateliers in any case and cannot be taken as a criterion of age. The use of the two superimposed ateliers to imply a division of the Michelsberg at Spiennes into an earlier and later phase does not seem justified on the basis of the evidence. In general, the connection with the Mesolithic has been overstressed for one must allow that, given the general availability of flint, the assimilation of a few surviving Mesolithic inhabitants by the incoming Neolithic folk would be sufficient to account for the situation, but even that is not strictly necessary. One must remember that the Mesolithic population of Belgium probably did not amount to 5% of the Neolithic, if Clark's estimates[2] on relative population can be taken as a guide. But the Neolithic population itself, using statistics on the Indians in the woodlands of North America as an estimate, probably didn't exceed a thousand individuals in the whole of the country (0.1 inhabitant for each 2 square kilometers).

The conclusion concerning the date of the mines is supported by the dates of active flint mining throughout northern Europe. None of the complex workings appear to refer to the early Neolithic with the possible exception of some of the English pits. Even in that country, mines appear to have been in full activity in Beaker times and, at Blackpatch, a Beaker burial covered by mine debris

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[1] Verheylewegen 1953.

[2] Clark 1954.

lying on more of the same was found[1]. In the extraction of Polish banded flint, the distribution of the product appears to correspond with the spread of the Globular Amphora culture[2] which dates from about the same time as our Michelsberg III and IV. The Rugen flint seams[3], judging from the contexts of the finds of the products, were worked most extensively in the early middle Neolithic in periods corresponding to Becker's TRB D and E, also roughly contemporary with the Belgian mines. The Danish deposits in north Jutland were most active at even a later date, and they are referred to the end of the Danish Neolithic[4]. We cannot be certain about the date of the mines in the Paris basin for none of them have ever been adequately investigated[5], but the largest bulk of their product, if one may judge from a superficial impression in the north French museums, probably was produced very late in Chassey time or in SOM time.

The other Belgian mine centers in the Liège area, Avennes, Braives, Meefe, Rijkholt-St. Gertrude are probably contemporary with the Spiennes exploitation, judging from identity of product form and finds of Michelsberg pottery at the first-named[6]. Moreover, the axe products of these mines have been identified in Michelsberg and the blades in later contexts in the Rhineland and Westphalia[7], and a similar observation applies to the products of the Lousberg mines at Aachen[8].

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[1]Piggott 1954 with refs.

[2]Krukowski 1920/22; Podwokinska 1955; Sawicki 1948; Zurowski 1954 (all for general data on Polish mines); and Clark 1952 for Globular Amphora correlation.

[3]Petzch 1928.

[4]Becker 1951; Gløb 1951; Grantzau 1954.

[5]Listed in Nougier 1950.

[6]Hamal 1921, 1923; van Giffen 1925, 1943; Destexhe-Jamotte 1947.

[7]Brandt 1941; Schmitt and Dehn 1938; Woelke 1937; Loewe 1955; Uenze 1956; and, with restrictions, Schumacher 1914.

[8]Liese 1930, 1934.

Using the short chronology, it would seem that there was a European-wide "boom" in flint mining during the period lying roughly between the limits 1900 and 1600 B.C. This period also corresponds to a very rapid series of changes and increases in the number of local cultures. We suspect that the mining, most of which was directed towards axe production, was connected with this development. It is probably a reflection of a sudden increase in population in the older occupied lands to the south resulting in an intense period of colonisation and forest clearance along the North Sea and Baltic shores and consequent high demand for axes of some efficiency.

Mining Tools and Mine Products

Within the north European flint-mining area, there is an astonishing community of extractive techniques and, consequently, of the tools which were used. This fact has also been used to infer a common Mesolithic substratum behind the mine operations[1]. In view of the strong indications (which have been brought out in the preceding section) that the mines were contemporary for the most part, a simple diffusion hypothesis seems more economic of the facts.

The Belgian mining tools share the characteristics of their English counterparts, with the absence of shovels made from ox bone and the use of hard stone axes[2] for cutting the chalk the two most notable exceptions. The miners at Spiennes used two types of flint pick

[1] Piggott 1954.

[2] Ibid.

(fig. 37, nos. 6 and 7) for this last purpose. One pick, triangular in cross-section, was possibly used more as a wedge; the other, somewhat flattened, would seem more appropriate for chopping off broad lumps of chalk. Occasionally, intermediate varieties, some with nearly square cross-section, also are found. These implements are the most common finds from the mines, having been fashioned in enormous quantities on the spot, possibly from flints which for one reason or other were considered less suitable for axe blanks.

After the flint seams had been reached, antler "picks" (fig. 41, no. 13) were driven in, possibly by antler hammers (fig. 41, no. 11). The "picks" were then used as levers with the butt acting as the fulcrum to pry out a considerable quantity of chalk and nodules, as many as seven "picks" being used simultaneously[1]. The two-piece rake (fig. 41, no. 12) may have been used to gather up the material, but that use is conjectural. We know that it was also a common agricultural implement in the Michelsberg culture, with examples from the Palatinate[2] and the Bodensee area[3] outside of flint mine contexts. Bone wedges of moderate size (fig. 41, no. 1) have also been found at Spiennes, but their purpose is not entirely clear. They are too small and too little worn to have been used like the "hand picks" of Grimes Graves[4].

There is less evidence concerning the illumination of the mine galleries at Spiennes than there is for the

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[1] Clark 1952.

[2] Alzey Museum, Galgenberg.

[3] von Troltsch 1902, fig. 103.

[4] Piggott 1954, p. 82.

English mines. Hollow chalk cups, possibly lamps, have been found[1], but the absence of soot marks on the mine roofs or of traces of deposit in the cups may argue against artificial illumination. In the cleared mine on the left bank, galleries a few meters away from the shaft are very murky indeed but, with more shafts open, sufficient light may have filtered through. However, in the really deep mines on the right bank, some illumination must have been necessary. There is ample evidence that the nodules were hauled up from the mines by ropes and perhaps the miners were let down the same way[2]. No evidence for the cutting of steps or holds in the narrow shafts has been recorded. The use of wooden ladders is not excluded but seems most unlikely in all but the shallower shafts.

Once on the surface, the nodules were given a first rough dressing to remove cortex and prepare striking platforms in the case of blade blocks (fig. 37, no. 8). These operations were carried out with two types of stone hammers (fig. 37,nos. 4 and 5) and perhaps by wooden hammers as well. The resultant rough axe blank with cortex partly removed (fig. 37,no. 3) or the blade block (no. 8) represents the first stage of mine product and both are found in vast numbers in and around the mines. Smaller blade blocks and their blades (fig. 37, no. 2) were the main product of the Obourg pits. The blade blocks were probably worked by the punch technique so well described by Evans[3] long ago, and the first few wasters, in the form

[1] MHN HaMo 115 cab. 61 no. 8754; and one in the collection of the SPRH in the Mons museum; both unpublished.
[2] Verheylewegen and De Becker 1957; De Loe and De Munck 1889.
[3] Evans 1897.

of long decortification flakes (fig. 37, no. 1) litter the area. The process of axe production was well described in one of the early papers[1] and it is not necessary to repeat it here. After working down with stone and wooden hammers from the nodule, the final touches were applied by antler tyne pressure flakers of the type shown in fig. 41, no. 7. The axe was then ready for polishing and the long blade ready for retouching to suit particular needs.

Clark[2] has analysed admirably the intent of Neolithic mining as the export of semi-finished products to conserve weight, and this applies clearly when one examines the finds outside the mining area. Hence, on this basis, we distinguish the flint tools made for "export", the types in domestic use in the mine area and, of course, the types required for mining which we have already discussed. It would appear, too, that the "ateliers" on the surface specialized in a particular type of production[3]. This is hardly surprising in view of the widely different skills required in axe and blade production, but it is also probable that these two products enjoyed their peak demands at different periods of time. The axes, as we have mentioned, were in greatest production during the wave of forest clearance at the beginning of the second Millenium B.C. However, the long blades in Belgian flint appear in later contexts in the Rhineland[4] and it is only with the appearance of the bronze-simulating Pressigny flint late in west German and Dutch Beaker time that the Spiennes and related Belgian blades no longer appear outside of their

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[1] De Loe and De Munck 1889.

[2] Clark 1952.

[3] De Loe and De Munck 1889.

[4] See Chapter VII.

own local distribution areas. The excellent Obourg blade flint which today outcrops just to the east of the Camp à Cayaux was never exploited. Perhaps the outcrop was not visible in Neolithic times for, as the section of the PABH quarry (Chapter III) shows, this area has undergone considerable post-Neolithic erosion.

Blade and axe production are not mutually exclusive however for, as Evans noted[1], blade blocks are sometimes reworked as axe blanks after as many large blades as possible have been removed. In Belgium, such blade block blanks are suitable only for the production of pointed-butt thin section axes, which we shall attempt to show was characteristic of the last phase of axe production of the mines in the Aeneolithic period.

Attempts[1] have been made from time to time to classify the types of axe blanks produced by the mines. Most have failed because the number of variants appears to be too great. However, if the finished, polished types are taken as the desired form (discussed in the next section), then the blanks most nearly corresponding to those forms may be taken as the ideal goals of production. The types are thus restricted to five--a wide, medium and pointed-butt axe, an imitation of a flat copper axe, and a blank for the so-called chisel.

Blade types show little or no variation, the aim being merely to produce as many long ones as possible. Two ridge types predominate (fig. 38, no. 5) but not excessively so.

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[1] Evans 1897.

[2] De Pauw and Van Overloop 1889/90 is a typical example. Of the many types given by them, we can accept only 1, 4, 5, 8 and 14.

The Axe Chronology and Trade

The aim of early flint mining was axe production, and it is curious that more attention has been devoted in the past to the processes of production than to the product itself. The output of the Belgian mines, especially when the blanks are polished, is quite uniform, the size and shape of the finished axes differing remarkably little from one another within a given type category. One of the earliest attempts to classify these finished types was made by Comhaire[1], but he made the mistake of designating as independent types those axes which, though similar in form, differed in size. Hence, he arrived at far too many types to be useful.

Evans' polished axe classification[2], worked out for the very similar axes of the south English sequence, was based upon variations in the medial section. The main categories were the oval or pointed oval, the squared oval, the flat oval. The pure oval is largely restricted to pebble axes and rarely appears in flint. These types do appear to have some significance in that the first two seem characteristic of early phases and the last named of later phases, but variations in the original blank produce many cases which cannot be ascribed with accuracy to one of these categories. In pebble axes, the form of the original pebble plays a preponderant role as Vouga showed in objecting to Reinerth's classification.

De Mortillet paid more attention to the form of hafting and noted[3] that the tenon-sleeved hafted forms

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[1] Comhaire 1894.

[2] Evans 1897

[3] De Mortillet in Materiaux Pour L'Histoire de L'Homme, 1886, p. 710 and second ed. of Le Préhistoire, p. 544. Reported in Dechelette I 1908.

were predominantly southern, while the perforated sleeve or transverse perforated handle were northern types. The form of hafting clearly plays an important role in determining the shape of the axe blade, and this observation on the two distribution areas is a valuable early contribution.

The first attempt to attach specific axe forms to particular archaeological cultures or groups of cultures was made by Schliz[1] who stressed the importance of the pointed butt oval section to the western Neolithic, the square cross-section to the northern, and the "shoe-last" adze to the Danubian groups.

Schumacher[2] was the first to imply that the observed differences in type, within a given Schlizian category, were chronological and that these differences reflected stages in the development of the axe hafting. However, he ignored the De Mortillet separation of the northern and southern hafting sequence, and arranged his types as sleeved, transverse hole, large hole (for sleeve) and double tenon--a sequence partially valid only in the south. In a later paper[3], Schumacher corrected the distribution and noted the two main northern haftings, the transverse hole and perforated sleeve, as early and late and the two main southern types, the holed club with or without simple sleeve and the double tenon variety, in the same chronological order. But, at the same time, he attributed the pointed butt axe which occurs in numerous hoards in the Rhineland to the Michelsberg culture, and

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[1] Schliz 1908, 1912.
[2] Schumacher 1913/15.
[3] Schumacher 1914.

this is surely not the case. In Belgium, the pointed butted flint type is definitely later, as we note below.

Reinerth[1] carried the system built upon the observations of De Mortillet, Schliz and Schumacher to absurdity when he applied detailed criterion of shape to the various forms of oval pebble axes and gave these variations chronological significance. Vouga[2] appropriately pointed out that the stratigraphically-placed finds in western Switzerland did not confirm Reinerth's sequence and, in fact, the shape of the original pebble was as much responsible for the ultimate axe form as any other factor.

Forssander[3] assigned the pointed butt axe to a specifically northern origin, and attempted to show its evolution in the Ertbolle milieu. But in two more recent papers, Becker[4] re-asserted the priority of hafting over shape as a determinant; and Childe[5] stressed the use of the adze over the axe in the southeast.

In the Belgian sites, axe haftings of the simple transverse hole type do not survive, but the large axes with wide, medium and perhaps pointed butt which were so hafted do survive. Sleeves with transverse perforation (fig. 41, no. 8) are known and, in one important instance[6], a pointed butt axe of moderate length (14 cm.) was found so mounted. Hard stone types, some of which are of local production, were possibly hafted in a simple sleeve of southern type but, to our knowledge, none has ever been found. The only antler sleeves found are of the

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[1] Reinerth 1923.
[2] Vouga 1929, 1934.
[3] Forssander 1938.
[4] Becker 1945/49.
[5] Childe 1950.
[6] At Vaucelles.

transverse perforated variety.

The pointed butt flint type (fig. 42, no. 8) is found in a definite SOM context in a transverse hafting at Vaucelles. The medium butt variety (fig. 40, nos. 12 and 13) are found in Michelsberg contexts in the Rhineland, with some pieces actual exports from the Belgian mines[1], and the wide butt (fig. 40, no. 14) is nearest to Mesolithic types in the North Sea "Kreis". Of these, the medium butt (length of 23 cm. and 8 cm. across the blade) is by far the most common at Spiennes, the pointed butt (14 cm. long) next most common, and the wide butt (over 25 cm. long, 10 cm. or more wide) rarest. Quite late in the mine production and still rarer are the flint imitations of flat copper axes (fig. 42, no. 7). Those four types plus the "chisel" in two variants, large and small (fig. 40, nos. 10 and 11), exhaust the types in production at Spiennes from the earliest phases of occupation down to the Bronze age.

1

Bonn Museum: Urmitz 43.135
Zülpich kr. Eusenkirchen 856,857,858
Wellendorf kr. Julich A 699
Koslar kr. Julich 49.21
Bonn Stadt 14736

Wiesbaden Museum: St. Stephens Hausen 1540
Grenzau 1670

Mainz Stadt Museum: (originals inaccessible); probably 270, 279, 339, 427, 436, 657, 678, 755, 873, judging from catalogue descriptions and drawings.

Köln Museum: examples listed in catalogue in unclear fashion; originals inaccessible.

The distribution shows a clear route from the Meuse valley across and then down the Rhine as far as the Mainz junction with the Main.

One would think that, with the rich sources of flint available, hard stone axes would be rarely used, and statistically this is the case. However, the hard stone axes which we do possess[1] are quite interesting for they show some of the connections which the people living in the valley had in various periods. The earliest type, restricted to two examples, is the typical Danubian "shoe-last celt" (fig. 40, no. 2). The illustrated piece, curiously enough, was found at Spiennes and another comes from Elouges. Both types were common

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1
A partial list of hard stone or imported axes from the Haine valley prior to the greenstone trade of the Aeneolithic.

MRC (Musées Royaux du Cinquantenaire):
Shoe last celt- Elouges B 726
Basalt (?) Ciply B 1264
Quartzite oval- Cuesmes B 2324
" " Nouvelles B 2292
" " " B 2326
" " Asquillies B 3266
" rectangular-Obourg B 2332
" " " 8488 R

MHN: Quartzite oval HaMo 357 8802 Devonian (local)
" " " 5496 " "
" " " 4911 " "
Turonian Flint 8122 possibly local
Quartzite oval with weathered minerals, right extinction-S 6919, St. Symphorien, Hardenpont density 2.66 (local)
Quartzite, oval, mica, psammite slightly metamorphic, density 2.36, St. Symphorien, S 7022
Augite, oval, uralitised, opaque undetermined mineral, density 3.04, St. Symphorien (Landenian, local), S 6990
Arkosite sandstone with schisto-calcareous origin and feldspaths, oscillating extinction, St. Symphorien, T 7022
Melaphyric tuffa, density 3.35, Ménu FC5496; sources in Saxony, Thuringia, Harz mt., possibly Saarland

MM (Mons Museum):
Spiennes 1953 ref. Adam et al. 1955--micaschist of Vosges or Rhineland massif type. (shoe last celt)
Other examples of quartzite pebble axes from Ghlin (illustrated) and elsewhere in valley. No rock determinations could be made.

enough among Rössen groups in the Rhineland, but there are severe chronological difficulties in the way if we suppose that they were brought to the area during the Michelsberg phase of occupation. We suspect that it is more likely that they were brought in by local late Mesolithic peoples either as curiosities or trophies; or perhaps they were surface finds made in the parts of the Meuse valley formerly under young linear bandkeramik occupation during the advance of the Michelsberg colonisation.

During the early phase of Michelsberg colonisation, it is not unreasonable to suppose that the tradition of using oval section pebble axes characteristic in the southern groups of that culture was continued in Belgium before the exploitation of flint got seriously underway and, for some purposes, the types (fig. 42, nos. 3, 4, 5, 7, 8) may have continued in use for quite some time.

Axes in hard stone of squared elliptical section with medium butt are also characteristic in the Michelsberg culture of the Classical area and in the Alsace groups (see Chapter VII). A very few of these types appear in the Haine valley[1] (fig. 40, no. 1, and no. 9). The first of these is not unusual in type but the stone from which it is made is clearly an import from the southeast, coming perhaps from Thuringia. The other example is the only case of a flint-like import piece, for it is made of a pinkish variety which the author has never seen before. In later periods, the jadeite axe and other pieces in green stones are not uncommon.

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1 Not illustrated; MRC B 2332, Obourg, Ferme des Wartons.

The stones for the oval section axes are likely to be of local provenance, coming from rolled stream deposits which have detached bits of Landenian or Devonian Quartzite. None of the pieces examined had the curiously roughened ends characteristic of the southern types for insertion into an antler sleeve.

Despite the attribution of one type to the Michelsberg culture by some authors[1], no battle axes have been found in the Belgian group. However, some axes probably related to late TRB contexts are known from Dutch Limburg[2]. It is also interesting to note that the line of separation of "western" axes and "northern" square-section flint types runs along a line extending eastward from the Zuider Zee to the German frontier[3].

The flint axe output from the Spiennes mines has been traced in Flanders, Hainaut, Brabant, Namur and parts of the Department du Nord[4] but, since both the sources of flint and the types in production from the mines at Rijkholt, Avennes etc. do not differ appreciably from the Spiennes output, it is difficult to define the boundaries of the distribution areas. It is probable that the Liège area mines supplied Liège (province), the Campine, and Dutch Limburg and probably most of the Belgian exports found in the Rhineland. Flint, as a non-crystalline material acquiring patination according to the soil in which it is found, cannot be classified

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[1] Vogt 1953; Mandera 1957; Baer 1956.

[2] I thank Dr. Stürms of Bonn for this information.

[3] De Laet 1958.

[4] De Munck 1931, 1934, 1935; Van Overloop 1885.

entirely upon the basis of material alone. The type and appearance taken together gives a fair general guide, however, and it is not difficult to distinguish axes produced in the Belgian mines from similar types originating in Luxembourg or in the Aachen area. The "chisel", so common in Belgian sites and within the "home" distribution area, never appears to have penetrated the Rhineland, but the long blades of roughly contemporary date do reach that area where they appear in various Aeneolithic contexts. The only example of a long blade of Belgian origin in a Michelsberg context is cited[1] as having been found with a widely-flaring tulip beaker most similar to the Belgian types, as we shall see. There is some evidence that not only were semi-finished products exported throughout the distribution area but that, in restricted instances, nuclei and even nodules were worked locally. At Boitsfort[2], this was the case, and there are probably other examples as well.

The question of trade in the period prior to the Aeneolithic has been the subject of a voluminous literature[3]. It is not our place to enter deeply into the question here, but it must be remarked that, outside the the "home" distribution area, the "trade" pieces of Belgian flint are in fact remarkably few in number. In this sense, there is little need to speak of "trade" for, as Jahn[4] has pointed out, these sparse finds can just as well

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[1] Gunther 1925, pl. 14, nos. 4 and 5.

[2] De Laet 1958.

[3] Summarised in Clark 1952; and further, see Mathiassen 1934; Schmitt and Dehn 1938; Brandt 1941; Anthes 1910 (with reservations).

[4] Jahn 1956.

be attributed to souvenirs, gifts, trophies and curiosities which travellers personally bring back. Within the "home market", there can be no question that a group of specialists was supported at the big mining centers and that their products were widely distributed throughout the area occupied by the Michelsberg culture in Belgium but, whether this phenomenon was productive of exchange relationships or whether it was an obligation on the part of the miners to other members of the group for which they received nothing tangible in exchange, the evidence at hand will not permit us to say.

Local Flint Types

In an area where flint-mining debris is so common, it is not an easy task to disengage the types characteristic of the various periods of occupation by dealing with the local material. Hence we are forced to turn to briefly occupied sites of known attribution which have flint types in common with some of the sites in our area. Such a site is Boitsfort which, in a definite Michelsberg context, furnished leaf arrowheads, steep retouched scrapers on blades and horseshoe scrapers, together with the usual medium butt Spiennes axe. This flint, as we have noted, was for the most part worked on the site and is all from Spiennes. The number of types is much fewer and they are simpler than in northern Mesolithic or upper Paleolithic contexts and give an impression of the selection of a few forms by people not accustomed to the rich easily-worked flint available in the area. This is consistent with our view that the Belgian

Michelsberg folk were not directly Mesolithic in origin, acquiring Neolithic traits through acculturation, as has been proposed recently[1]. Piggott has noted[2] a similar relative paucity of flint tools directly associated with the Windmill Hill culture and only later found the re-emergence of a whole array of Mesolithic types in Aeneolithic contexts. This situation is roughly paralleled in Belgium.

Though the British flint mines were restricted largely to axe production, the Belgian mines produced flint for a whole array of types mainly for local consumption within the valley itself. However, these "rich" type arrays are segregated and confined to only a part of the surface scatters, and these may be thought of as the equivalent of secondary Neolithic sites in the valley. The alleged specialization of working floors at Spiennes has been noted in a previous section, and those which produce long blades tend also to be those which supply the larger range of types equivalent to those in the "rich" surface scatters.

Long blades (fig. 38,no. 5) reach very considerable dimensions indeed, 30 cm. being not uncommon. Most often, however, they are broken and used as raw material for confection of end-of-blade scrapers like no. 6 or as knives. Smaller blades and blade blocks are frequent finds not only in the local mining area but also throughout the entire distribution area. The large blade blocks, however, are almost never found far afield. This is probably a

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[1] Gabel 1958.

[2] Piggott 1954.

reflection of the high degree of skill required for long blade production and its retention as a jealously guarded secret among a few of the inhabitants of the valley.

A similarly skilled product, which we cannot directly associate with fabrication at the mines, is the projectile point. Most of them occur as surface finds, as is natural considering that they were probably lost during the hunt. Some, such as nos. 1, 2, 3, 7 and 10 of fig. 39, are possibly Mesolithic in origin though it is not unlikely that the types figured, together with the very numerous tranchet forms not illustrated, were current during the re-emergence of Mesolithic traits in the Aeneolithic. To be attributed to the Michelsberg settlement are the leaf shapes of fig. 38, nos. 4 and 5 and the triangle with convex base (no. 8). It is also possible that the simple tanged type (no. 13) also belongs to this category, though there is more than a suspicion that it lived on longer than did the Michelsberg occupation. The attribution of types to the Michelsberg settlement is based on finds of parallel types at Boitsfort. In the Rhineland, however, leaf shapes are missing. In Belgium, concave-based triangles, so common elsewhere in the Michelsberg culture, are almost absent.

The arrowheads of later periods, the Aeneolithic and the early Bronze age, tend on the other hand to belong to central and north French series[1]. Types include the drooping barbed and tanged of fig. 38, no. 9, so typical of the Breton chalcolithic, the squared barbed and tanged of no. 14, and the exaggerated tanged shapes of nos. 11, 12,

[1] See, for example, De Mortillet 1903.

and 15. Childe[1] long ago noted that the proportion of these later types was significantly lower than the leaf and sub-triangular types in the Belgian collections, but no definite contexts are known for any of these finds. None of the later types has ever been found with any of the earlier ones, bearing out the old observation of Smith[2] concerning a similar situation in the English series. There is some evidence[3], however, that in north France the leaf arrowhead is not as restricted in time as formerly thought and may indeed survive into SOM times.

In the Michelsberg assemblages, the horseshoe scraper (fig. 38, no. 7) is quite common, as are a series of round double scrapers typified by no. 9. Assymetrical scrapers like no. 10 appear in all contexts. Restricted, however, to the "secondary Neolithic" assemblages are the Y scrapers (fig. 38, no. 8). The type is quite common[4] but its use remains enigmatic. It has also been noted in secondary Neolithic contexts in Britain[5]. But, on the whole, the British scraper series diverges from the Belgian in that it possesses no end-of-flake or thumb types which are so common in the latter. Awls (fig. 38, nos. 11-flake, 13-core) appear often in the surface collections and, together with knives blunted along one edge (no. 12) appear very primitive in form. Together with the so-called "orange quarter" they have a very Mesolithic aspect. Similarly, tranchet axes (nos. 2 and 3) together with occasional unpolished used flake

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[1] Childe 1931.
[2] Smith 1927.
[3] Bailloud 1955.
[4] MHN HaMo 106, ca6.54 #8754; also HaMo 291 and Mons Museum, no. numbers.
[5] Piggott 1954.

axes (no. 1) characterize the rich late assemblages. A peculiarly recurrent type is also the re-worked axe blank (no. 4) which has been fashioned into a rather fantastic shape for some sort of hafting as a gouge or chisel. The only example of a polished gouge comes from Ciply (fig.40, no. 6) and, unfortunately, is a stray.

Flint sickles are of two types (fig. 40, 14 and 15). Both are very common, and the lunate variety is more likely to be earlier for the other appears to be an imitation in flint of a distinct late Bronze age metal prototype. The lunate variety is related to types occurring throughout the Michelsberg distribution area[1] and has also been noted as far as Yorkshire[2]. None, as far as we know, with the exception of the find from Eschenz[3] have ever been found in a definite context. The types imitating metal varieties must have had a very long life indeed for recently a hoard of them was found in Holland in a La Tène barrow[4]. A major center of production in Aeneolithic times lay in Jutland[5], and numerous examples of this type have been found in hoards throughout the Low countries[6]. They do not appear to have been produced at Spiennes, and Spiennes flint does not seem to have been used for sickle production at any period/for other than local use.

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1 Unpublished photographs, photo archive, RGZM See also Jorns 1953, p. 21, fig.4, no.8.

2 Information from R.J.C. Atkinson.

3 Frauenfeld Museum 3613, illustrated in Stroebel 1939 and erroneously attributed to the Schnurkeramik layer at the Insel Werd site. Keller-Tarnuzzer, the excavator, stated categorically to me that it comes from the Michelsberg layer.

4 Information from Wm. Glasbergen.

5 Glob 1951.

6 Heiloo, Holland, figured in De Laet 1958, pp. 114-15.

Non-Mining Tools in Bone and Antler

Because the soil is so highly calcareous, bone tools survive rather well in the Haine valley. Almost all examples which are not directly connected with flint mining serve for the preparation of skins. The so-called "paper cutter" (fig. 41, no. 10) is the only possible exception, for some authors[1] have thought that it may have been used in pot-making as a smoother. However, very few of the pots are burnished, and those which are appear to have been treated with a small pebble. The "paper cutter" is more probably a variety of scraper.

The variety of chisels or gouges in bone (fig. 41, no. 4) is not great, limited to the form shown, but the implements are not rare in contrast with British sites. They were certainly used in removing fat and other soft materials from the underside of skins. Such bone chisels in Britain survive into the early Bronze age[2]. They have a predominantly western distribution and have no obvious Mesolithic antecedents. They are also common in the Scandinavian middle Neolithic[3].

Antler combs (fig. 41, no. 9) are known in about half a dozen instances from the Haine valley, and another example has recently been found not far from Liège[4]. Parallels in the south of England and a single example from Schleswig[5] led Piggott[6] to use the implement as a guide to TRB influence in the south English Neolithic.

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[1] De Loe 1928.
[2] Piggott 1954, p. 84.
[3] Ibid.
[4] Dierick 1957.
[5] Schwantes 1939.
[6] Piggott 1955.

The type is not at all common in TRB contexts, but other examples are known from the south Rhine group of the Michelsberg culture[1]. We cannot tell if the comb also occurred in the Rhineland groups for, in general, bone does not survive in sites north of the Main valley. There is some suspicion that, if most of the bone material from the Classical group had not been lost, we might be nearer to an answer to its origins.

Piggott believes that the combs were used in dressing the outside surface of skins and givesa very clear picture of the method of production[2]. A burin technique is implied, however, and, in the absence of burins among our minor flint finds, we are not entirely happy about the assumption.

It seems doubtful that the comb can be attributed to a particular culture, for the distribution is too wide and too few examples are known. It seems to have been used from a time equivalent to the early English Neolithic, through the early Michelsberg culture on the Bodensee, down to the late Michelsberg in the Haine valley. Other examples are stray finds without definite ceramic contexts. With such a wide time span, the type does not appear to be a useful "zone fossil" either.

Bone pins are very common at Spiennes, and are of two types, split (fig. 41, no. 6) and polished (nos. 2, 3 and 5). They are occasionally pierced (no. 2) to serve as needles but never ornamented or elaborated in any way. Their use in the preparation or fastening of leather clothing is obvious. The total absence of spindle whorls,

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[1] Buttler 1938, pl. 21; other examples in Rosegarten Museum, Konstanz.

[2] Piggott 1954, p. 83.

loom weights or any other indication of cloth production in the Belgian Michelsberg contrasts with the finds south of the Main valley. There, these indications are common, whereas leather working tools such as we have in Belgium are rarer. A number of types common on the Bodensee, such as the two-pronged bone fork or the bone and phalange pendant, never appear among the Belgian finds.

In general, there is a considerable difference between the bone types of the Belgian group of the Michelsberg culture, as typified by the Haine valley examples, and those of the other Michelsberg groups; and a still greater difference separates them from members of Danubian-connected cultures. The finds from Schussenried, for example[1], differ sharply from the Belgian examples and somewhat from the south Rhine types. The Belgian types are, on the other hand, firmly in the western Neolithic tradition, thoughit is possible, as has been proposed[2], that this tradition has its origin in the adoption of types and skin dressing techniques from the indigenous Mesolithic on either side of the Channel.

Burials

Finds of human remains in many different situations, accompanied by Michelsberg material, have led to the error of identifying each of these as formal burial ritual of the Belgian Michelsberg culture. Interment in the "ateliers" or disused mine shafts has been claimed at Spiennes[3] with an elaborate ritual of defleshing and

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[1] For example, Von Troltsch 1902, pp. 107-8; and collection at Tubingen.

[2] Piggott 1954, p. 85.

[3] De Loe and Rahir 1929.

secondary interment proposed. Pottery and broken tools are alleged to have been part of a ritual[1]. In fact, these finds represent little more than the casual dumping of human remains into rubbish pits, a phenomenon which also occurs on the Michelsberg itself--though incorrectly reported as a pit burial in the older literature[2]--and in Alsace[3]. More positive evidence for collective inhumation comes from the Trou de Frontal, where 16 individuals were found accompanied by a pot of characteristic late form (see Chapter VII)[4]. At Avennes, interments by simple inhumation were found[5], and a single corpse was buried at Zwijndrecht[6]. All of these disposals of the dead which show a relative lack of concern with ritual are reasonably characteristic of the whole of the Michelsberg culture, though the collective burial at the Trou de Frontal points to the SOM tradition which may have begun to influence customs at a late phase.

The mound at Ottenbourg which we had tentatively identified as a long barrow[7], requires further investigation before the assumption can be proved. The reported finds in the old excavations [8] are not convincing, being restricted to a few scraps of pottery and a handful of worked flint. The surrounding fields are choked with the remains of a considerable Neolithic settlement, aptly located on an easily-defended hill top, and it is

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[1] De Laet 1958.

[2] Bonnet 1899; Schumacher 1921. See Chapter VII for discussion of new excavations by Dauber, disproving the old theory.

[3] Forrer 1912.

[4] Dupont 1871.

[5] Destexhe-Jamotte 1947; and Colman 1954.

[6] De Pauw and Willemsen 1904/5.

[7] Noted in Piggott 1955.

[8] De Loe and Rahir 1924.

not impossible that the Ottenbourg long mound was built at a later date, incorporating some of the material from the settlement in its construction. Similar incorporation of settlement debris at Boitsfort by natural transport in the eroded ditches is also likely, giving rise to the erroneous reports[1] of burial banks.

Pottery and Chronology

The pottery of the Belgian group of the Michelsberg culture is strongly represented in the Haine valley finds. The most common shape is a wide-mouth bowl, forms 4 a-i in figure 44. Profiles range from a smooth sweeping S curve to a sharply-carinated form. In the literature, this form is called a tulip beaker[2] but the term should really be applied only to form 4a. Many of the variants of form 4 correspond to forms common in the south English[3] and north French[4] Neolithic. Infrequent types like forms 6 and 7 have more exact counterparts in the Chassey culture[5]. Some of the wide-mouth bowls like form 4b, a common type, have "pastilles en relief" around the inner rim, a feature which appears in the Chassey of the Aisne[6] though more common in south French groups. For comparisons with Chassey, the reader is referred also to figure 62 where some of the relevant types mentioned above have been assembled.

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[1] De Loe and Rahir 1925.

[2] The first identification of the Belgian material as belonging to the Michelsberg culture is that in Bersu 1926, where the term tulip beaker is applied to pots from Boitsfort which have close parallels in the Rhineland.

[3] See Piggott 1931; 1954 , fig. 27, no. 3, pl. III, no. 7, fig. 17, no. 2.

[4] Piggott 1953/4.

[5] Arnal and Burnez 1957.

[6] Op.cit., pl. 75.

The flat ceramic disk known in the literature as a "baking plate", though perhaps actually a storage jar cover, is usually taken as a common feature of the Michelsberg culture. It is not rare in the Belgian group, with all examples coming from Spiennes where, as form 3, it occurs without the finger impressions so common further south. More common ornament in Belgium is confined to simple vertical strokes around the rim, though unornamented examples are also common.[1]

In Belgium, the flat or round bottom carinated bowl of form 2a, b, and c is common in the sherd collections though only one example in Brussels has been put together. Hemispherical bowls, form 1, are infrequent, and the two known examples were found together in the same pit at Spiennes. They have unusual flat bottoms. Colman[2] believes that they are to be attributed not to Michelsberg but to the SOM culture. However, as we shall see, similar bowls are known from other Michelsberg groups, and the paste and technique are identical with the other pots of the Belgian Michelsberg. Large storage jars of forms 8 a-c with finger tip ornament around the rim are very common and exist in two types with rounded and pointed bottom. Profiles are usually carinated, and a scraggy slip applied to the exterior is common. Form 8b is a rarer piece in that it has no finger impressions. Lugs are exceedingly rare on all of the Belgian pots. The Trou de Frontal piece, form 5, is the only nearly complete example[3] though a few

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[1] Nougier's 1953 study of the distribution of the baking plate, with which we can otherwise find little to agree, does show that this type is not the exclusive property of the Michelsberg culture. This is also shown by the Store Valby finds--see Becker 1954--and the unpublished Dölauer Heide fragment--see appendix, distribution map.

[2] Colman 1957.

[3] Colman 1954 was the first to recognise that this pot is Michelsberg. Marien 1952a, who figured it incorrectly, assigns it to his "Meuse néolithic".

tube lugs, probably from similar pots, are in the reserves of the Cinquantenaire and come from Spiennes. Grain imprints are very common on the Belgian sherds with the exception of the highly-burnished carinated flat-bottom bowls of form 2 a-c. In general, the paste of the Belgian pots is poor, with broken flint or, occasionally, quartzite gritting. Burnishing is usually poorly executed and the firing temperature must have been rather low. Other pots not illustrated in fig. 44 show similar characteristics[1].

In a recent critique of Colman's work on the Spiennes pit inventory[2], Verheylewegen claims that this pottery is imported at Spiennes and that the site was actually occupied by some "Campignian" folk. In support of this statement, he quotes Clark[3] (without due credit) on the few rare examples of pot imports known at this or earlier periods and, by leaving out the beginning and end of Clark's paragraph, completely distorts and inverts Clark's contention that, in fact, such imports are excessively rare phenomena. Verheylewegen would, we think, be hard pressed to account for the flint gritting in some of the pots[4]-Spiennes flint no less--and for the fact that the Rhineland pottery which is most nearly parallel to the Belgian finds has only a quartzite gritting. Moreover, he leaves out of account the half-

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[1] MHN 61, from Carrière Hardenpont, St. Symphorien. Other sherds from Spiennes in the Ashmolean, Oxford, 1927. 5361-5447 along with other parts of the old Tolliez collection bought by John Evans. My thanks to Mr.Humphrey Case for this information. Still others, now lost, were in the MRC--see De Loe and De Munck 1889 where two Michelsberg and three SOM profiles are shown.

[2] Verheylewegen 1957.

[3] Clark 1952.

[4] Noted long ago by De Loe and Rahir 1929.

dozen other Belgian Michelsberg settlements which do not occur at flint mines and which have pottery directly comparable with that of Spiennes and St. Symphorien.

Though there is reason to believe that the Belgian group of the Michelsberg culture is Rhenish in origin (see Chapter VII), it is clear that the pot types undergo local development and the group acquires distinct characteristics of its own, possibly through contact or assimilation of neighbouring western groups[1]. Pointed stick ornament appears, for example, on a few sherds in the MHN[2] in a random pattern similar to finds from Chassey itself[3]. Other connections can be seen in the so-called "vase support" from Spiennes (fig. 44, no. 7), the "vase support" from the Zwijndrecht burial[4], the Chassey bomb pot of fig. 44, no. 6, and the relief pastilles of no. 4b.

The strong possibility exists of a pre-Michelsberg, older Chassey occupation of the westernmost parts of Flanders and possibly the Belgian coast. The types of wide-mouthed bowls from this region, the Antwerp, Zwijndrecht and Lommel finds (fig. 44, nos. 4i, 4g, and 4f), all have much sharper carinations than do the southern examples from the Haine valley, Boitsfort and Avennes. They have the greatest similarity of any of the pots in the group with the finds from Sussex and with new finds from Lumbres in the Pas de Calais. This situation

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[1] For comparisons with other western types, see Childe 1931. For the opposite view see De Laet 1956 and 1958; and for a general summary of the material see Marien 1952a or Colman 1954.

[2] Cab. 63.

[3] Dechelette 1908, p. 556.

[4] Marien 1952a, p. 64, fig. 60.

may well be due to the presence of a direct strain of Chassey folk nearby and would account for the strong injection of western traits in the Belgian group.

There are other connections between the Belgian sites and those in Sussex which have long been noted[1]. Mines are of much the same type as has been brought out before; camps like the Trundle, Whitehawk, Combe Hill etc. are not without parallel. Antler combs, similar flint work, bone types etc., all point to the connection. So, too, do the dependence on leather working, absence of spinning and weaving, and the high proportion of scrapers. However, the British pottery in Sussex often bears ornament which has no Belgian equivalent, and we see any connection not as a direct one but through probable common contacts in the Pas de Calais and in Picardy. The chronology which we work out in the next chapter would support this assertion, for the Belgian group may be a bit too late to have had direct connections with Sussex.

Despite the observations by Hawkes[2], the connections between the Belgian types and the bowls in Yorkshire are quite weak when one examines the two sets of profiles. There is not a trace of tendency to beading in the Belgian examples, though this is a common feature in Yorkshire. Comparisons of wide-mouth flaring bowls per se are of little validity.

There is some similarity in the Belgian "burials" and the British methods of disposing of the dead. Piggott remarks[3] that "the bodies of the dead were not always

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[1]Childe 1931.
[2]Hawkes 1940.
[3]Piggott 1954, p. 47.

regarded with the respect that demands burial of the corpse, but may be taken to hint strongly at cannibalism".

In no case can connections be with the early Neolithic in Britain, for the Peacock's Farm finds show that this phase is earlier than the last (fourth) Littorina transgression[1], and we can show that Belgian Michelsberg is very much later. The earliest Michelsberg in fact, our Classical Michelsberg I, must be later than the transgression for, as we show in the next chapter, it is contemporary with the end of Dolmen-beginning of the Passage grave period in Denmark. The Belgian group, later even than Rhineland Schnurkeramik, can have had no direct relations with the early English Neolithic.

The boundary between finds of the Belgian Michelsberg and the C stage of the TRB culture in Holland may be accidental. One must first account for the possibility that an earlier western group, leaving its mark upon the northern finds as noted above, helped to create this boundary or, alternatively, that the two cultures, TRB in Holland and Michelsberg in Belgium, were never in contact for they were in their respective areas at different times.

Both Marien[2] and De Laet[3] greatly inflate the absolute dates of the Belgian Michelsberg: Marien is too dependent on the chronology of Milojčić for the beginning of Michelsberg in the Main-Neckar region, which he takes to be contemporary with the formation of the Belgian group: and De Laet depends uncritically on the

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[1] Piggott 1954, p. 377.
[2] Marien 1952a.
[3] De Laet 1956, 1958.

C14 dates for Weier-Thayngen which he used without taking the statistical variation possible from the mean. Furthermore, it is unlikely that Weier and the Belgian group are contemporary.

The distribution of the Michelsberg culture in Belgium can only be judged approximately because of the loss of the sherds from many of the older excavations in Flanders[1]. Spiennes flint cannot be used as a criterion for, as we have seen, it is mined in the Aeneolithic as well, and we will show in the next section that this activity is not connected with the Michelsberg culture. The population of the Scheldt valley is likely to have belonged to the group, judging from the descriptions of the sherds in the old reports and, of course, the Liège area and the Meuse valley must have served as a corridor for the entrance of immigrants from the Rhineland, as Buttler claimed. The finds from Avennes and Furfooz show that.

Treatment of the Meuse valley finds as of a secondary Neolithic character[2] may be justified, but inadequacy of excavation makes it likely that some of the later Neolithic sites which have strong Mesolithic traits have been mixed and confused with primary Michelsberg material. Gabel's idea[3] that the Michelsberg culture is in itself a secondary Neolithic culture, an idea voiced indirectly by Childe[4], is irrelevant in the Belgian context. Wherever the culture originates, no one will

[1] Mendonck, Melle, Oudenaarde, Denterghem, Emelgem, Roulers.
[2] Marien 1952a.
[3] Gabel 1958.
[4] Childe 1957.

pretend that it does so in Belgium; hence for Belgium, it is primary Neolithic even if, in its ultimate origins, acculturation of Mesolithic peoples could be proved to be its source. The indiscriminate use of the concept of secondary Neolithic cultures is questionable when the real situation is obscured by inadequate excavation and lack of attention to ceramic evidence. The secondary Neolithic concept of origins is really only a last resort when all other attempts at explanation fail. It is in danger of becoming a catch-all screen for ignorance, an up-to-date "Campignian". There is evidence, and strong evidence at that, for late Neolithic cultures in the Haine valley--cultures with a "heavy" industry as defined in relation to the English secondary Neolithic cultures. But this culture to which we devote the next section surely did not originate in the valley, and it arrived with a full collection of ceramic forms as well. Hence it too is not "secondary" in our region, though it may be so in origin.

The Aeneolithic Period

We cannot place a definite terminal date to the Michelsberg occupation of the Haine valley, but it is quite certain that a change in cultures took place sometime just before the beginning of the early Bronze age. The new ceramic finds are far fewer than those which we can attribute to Michelsberg, perhaps because the quality of the paste is so poor, and that seems to be why the existence of this later phase of occupation had not been accorded general recognition before. Figure 42 shows some of the typical pot profiles as well as other

finds. The forms are mostly flat-based, and some, notably nos. 12, 13, 14, 15, 16 and perhaps 11, bear a close resemblance to types usually called Seine-Oise-Marne in the literature. However, these are not the only types which have been found. The shapes of nos. 9, 10, 20 and 21 occur with some frequency as well and appear to be distinctly characteristic in the Haine valley. Further, there are a few fragments of Beaker pottery from one pit[1] at Spiennes (nos. 17, 18 and 19) which possibly represents the presence of a single individual--the paste and technique is uniform in all the sherds. The beaker is of a type commonly found in northern Belgium and southern Holland[2].

We use SOM here in the Haine valley not as a cultural designation but, rather, as a chronological one for the entire SOM complex seems to reflect more than one culture, or at least regional groups of a whole family are involved. Other indications supposedly characteristic of SOM and early Bronze age settlement are megalithic; at least four standing stones have been recorded in our area, and a possible fifth may have exited. Two of the surviving examples are illustrated in Pl. 7. They have been transferred from their original positions, the St. Symphorien stone to the garden of the Mons Museum, and the Haulchin stone to a spot in front of the village hall (Maison Communal). The stone of Ville-sur-Haine survived until quite recently[3], and that of Bray stood until the middle of the 18th century when it was destroyed and used

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[1] MHN 63.

[2] Marien 1952a, fig.134 (Lommel)

[3] De Munck 1894.

for road material[1]. The Bray megalith, reported to have towered some 6 meters above ground level and to have weighed over 100 tons was probably the largest standing stone in Belgium. A fifth stone is reputed[2] to have come from a spot near Givry (no. 83 on fig. 35), but it has disappeared.

All of the surviving stones are in local material, and it seems likely that erratics which occur in some of the Tertiary deposits in the area were much favoured for they involved little re-working. The Haulchin stone still has some lifting holes visible in spots, and it retains its shape to a large extent. That of St. Symphorien is much weathered, and spalling has reduced it considerably. Both surviving stones were found buried, one in the garden of the chateau at St. Symphorien (though it is known to have come from high on the Harmignies cuesta), the other in the fields south of the village of Haulchin.

Surviving megalithic monuments, a few of which have delivered pottery not unlike that which was discussed above, have been reported from other places in the Sambre-Meuse area. Finds from the small dolmen at Wéris are most nearly related. Other finds of SOM pottery are attested from Vaucelles[3], Hulsonniaux-Abri de la Poterie[4], Walzin-Trou de la Naulette[5], Ben-Ahin[6] and Dourbes-Trou de Blaireau[7], all of which are collective cave burial sites.

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[1]Lejeune 1875.
[2]De Pauw and Hublard 1906.
[3]De Loe and Rahir 1904.
[4]Marien 1950, 1952b.
[5]Marien 1950, 1952b.
[6]Thisse and Destexhe 1948.
[7]Saccasyn (unpublished); see De laet 1958.

Small stone barrows south of Namur have also been attributed to the SOM occupation by Marien[1] (at Roly, Fagnolle, Solre-sur-Sambre, Dourbes, Frasnes, Pétigny and Boussu-en-Fagne). Judging from descriptions and meagre illustrations in the literature, finds also occurred at Rijkholt-St. Gertrude[2], Aubel[3], Fouron St. Pierre and St. Martin[4] and, in our area, at Caillou-qui-Bique[5]. Numerous standing stones which have been recorded in southern Belgium have also been attributed to the culture[6]. Hence the finds in the Haine valley are by no means unique. It seems likely that, excluding extraneous material, one has a complete regional group of the SOM culture though the materials which survive are too fragmentary to attempt its complete description. One cannot agree with the recent rejection[7] of Marien's idea[8] that SOM groups occupied the southern half of Belgium while Beaker folk lived in the north, in view of the distribution of the evidence above. The only contrary indication showing finds of SOM material in the northern part of the country comes from a recent excavation at Elewijt[9] where sherds not unlike some of those we have illustrated and also similar to some from old excavations at Spiennes[10] have been found. Evidence for Beaker

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[1] Marien 1949.
[2] van Giffen 1943.
[3] Refs. in Nougier 1950.
[4] Hamal 1921.
[5] De Pauw and Hublard 1901/2.
[6] List and map (incomplete) in Marien 1952a.
[7] Sandars 1957.
[8] Marien 1952b.
[9] Claes 1957.
[10] De Loe and De Munck 1889.

penetration of the SOM area is more or less limited to the few sherds which we have mentioned above. It seems likely that a careful study of Marien's "Meuse culture" would show that it has a strong SOM component when it is not to be attributed to Michelsberg.

When Marien denies SOM occupation at Spiennes[1], asserted by Childe and Sandars[2] on the basis of antler sleeves found there, he ignores the pottery which survives in his own collection[3]. It seems likely that the antler sleeve may not be in fact strictly attributable to SOM time, but the preponderant number of finds lies in that period.

No Grand Pressigny flint in definite association with Michelsberg finds exists in the Haine valley nor, despite assertions[4] to the contrary, in the whole of the Michelsberg culture. However, it has frequently been noted that this characteristic material occurs in SOM contexts. Spiennes flint was never used for over-all pressure-flaked daggers in the Grand Pressigny manner, but one of the Grand Pressigny pieces found its way to Spiennes itself (fig. 42, no. 3). This magnificent specimen was found on the surface in 1864, though tradition in the family of the owner has it that some digging for drains was going on nearby. The color of the flint is light coffee-brown with tiny mica flecks here and there in the surface. A similar example from Munro in the

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[1] Marien 1952b.

[2] Childe and Sandars 1950.

[3] MRC 6, 22, 24, 28, 33 (Also, MHN 3, 12, 22, 34, 50, 63)

[4] Hawkes 1934.

Ardennes[1] is the only other example of this type in Belgian collections. Other examples of Grand Pressigny flint have been found in Belgium and connected with Beaker contexts in the north.[2]

A find of a similar nature is the dagger from Bernissart[3] which occurred with simple interment. We have not been able to see the original and do not know of what material the blade was made, but it appears to have been smaller than the Spiennes find, only partially retouched on one face and not at all on the other. The Spiennes dagger, on the other hand, is bifacially flaked though, judging from the slight curve, it was worked on a very large blade. Like the Spiennes find, we know very little about the circumstances of the Bernissart discovery.

Many of the minor flint scatters which we discussed in a previous section, especially those with a richness of types approaching Mesolithic forms, must be attributable to the SOM occupation of the valley. However, certain specifically French flint types do not occur, notably the "scie à encoches"[4]. The barbed and tanged arrowheads which are quite numerous probably also belong largely to this period, and it is possible that a number of Spiennes "fonds de cabanes" excavated in 1912-14 which furnished a few points of this type also had associated SOM pottery[5]. Unfortunately, the finds could not be located in the MRC reserves to check this.

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[1] Marien 1952a, fig. 160.
[2] Marien 1948.
[3] Fagès and De Meester 1891/2.
[4] Bailloud 1955.
[5] Rahir 1928, fig. 97.

The production of the Spiennes axe factory certainly continued into SOM time, producing the medium butt of Michelsberg associations in lesser quantity, and concentrating on the pointed butt variety. At Vaucelles, two medium butt types and three pointed butt variants were found with a transverse pierced antler sleeve, all in association with the well known pot. Imitations of flat copper axes[1] (fig. 42, no. 7) which represent one of the minor types in the factory production probably also belong to the period. Furthermore, an actual hoard (fig. 42, nos. 4 and 5) containing a flat copper axe, a square-section greenstone axe, and other scraps of bronze has recently been found at Jemappes[2]. Petrographic and spectroscopic analyses are not yet available but, on the basis of the form of the greenstone axe, it seems likely that the material is of German provenance rather than coming from the west[3]. A fragment of a similar greenstone square-section axe was found long ago at Mesvin (fig. 42, no. 1). Perhaps a dozen examples of flat copper axes are known from Belgium and Holland [4] but the Jemappes hoard is the only one which associates the finds with the square-section greenstone type. De Laet thinks[5] that most of the finds are Breton, English, Welsh or Irish in origin, but the form of the Jemappes axe argues against this. Copies of bronze prototypes in

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[1] Other examples:
MHN - HaMo 100 8754, cab. 50 with SOM pottery (no.20,fig.42)
HaMo 167 8643 (2 examples)
HaMo 171 no numbers (2 examples)
HaMo 358 #58/5496
De Pauw and Van Overloop 1889/90, no. 8.
Hamal 1925 find, illustrations, with SOM pottery (?)

[2] I am indebted to M. Paul Moisin of Mons who furnished me with plaster casts of the finds and all information in advance of his publication.

[3] Numerous parallels illustrated in Sprockhoff 1938.

[4] DeLaet 1958.

[5] Op.cit.

flint are relatively rare, and the largest example (fig. 42, no. 6 from Casteau) has no parallels in Belgium, though some from northern France are reported in the first publication of the find[1].

Greenstone pointed-butted axes, on the other hand, are quite common as surface finds in the valley. We illustrate only one (fig.42, no. 2) of several[2]-- all of which are smallish (between 7 and 10 cm. long), elliptical in cross-section and with fairly thick mid-sections in contrast with the broad, thin blades found in the northern parts of the Scheldt valley[3]. Imitations of the type in Spiennes flint can probably be seen in small thick versions of the pointed-butt flint axe (fig. 42, no. 8) which are quite common and which were the type probably hafted in the transverse pierced antler sleeves (judging again from the Vaucelles example)[4].

Associations of Spiennes (or Belgian) material in the Rhineland for the later phase of the operation of the mines have been previously noted as restricted to long blades in a number of hoards[5] all of which, when found in context, have been with late beakers or so-called "Nord-west steinkist" finds.

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[1] De Pauw 1894.

[2] Other examples:
MHN - St. Symphorien-Hardenpont Sl 6990, density 3.33 jadeite
MRC - Harmignies N 1211 B
Bois d'Havré B 2776

[3] For example: Marien 1952a, fig. 175, attributed to full Bronze age.

[4] A partial list of literature in greenstone axes and their association: Piggott 1948 (with references) attributes the finds to Beaker-SOM times; Forde 1930; Andree 1922; Anthes 1910.

[5] Literature and all examples listed in Loewe 1955 and Uenze 1956.

CHAPTER VII

THE EUROPEAN SETTING OF THE NEOLITHIC IN THE HAINE VALLEY

(REGIONAL GROUPS IN THE MICHELSBERG CULTURE)

Introduction[1]

In order to discuss the origin of the Michelsberg culture, a question which has been the subject of much debate during the last five years, a closer definition of the culture is first necessary. This chapter begins by reviewing the theories as to origins which have been offered during the last half century; a detailed description of the elements making up the various subdivisions of the culture is then attempted, together with some observations on the internal chronology of the material; and, in conclusion, a return is made to the question of origin.

We owe to Schumacher[2] the first identification of the culture by name, though it was Reinecke's[3] contribution two years later which proposed its attachment to a "western" Neolithic family in an article written, as usual, with an insight years ahead of its time. Schumacher had thought that the culture was a late phase of Bandkeramik (Danubian I) influenced by Schnurkeramik (Corded Ware).

Later[4], Reinecke modified his views somewhat and noted the close connection between the material of the Swiss lake dwelling cultures and the Mesolithic of

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[1] This chapter will appear in a forthcoming number of the Proceedings of the Prehistoric Society.

[2] Schumacher 1898/1899b.

[3] Reinecke 1900b, stated precisely by Schuchhardt 1913.

[4] Reinecke 1908.

Scandinavia and, in two short papers, laid the basis for the second of the principal theories as to origins. It is interesting that the same man was reponsible for two major trends in archaeological thought on the question.

Schuchhardt[1], seeing the possible derivation of western ceramic forms from leather prototypes, proposed this as a basis for characterizing the entire family of western Neolithic cultures, including the Michelsberg culture. Schliz[2], on the other hand, proposed a separation of Michelsberg and the Swiss lake material, speaking for the first time of a "Pfahlbaukeramik" as distinct from a "Michelsberg keramik".

Schumacher[3], after a re-examination of the situation in a general study of the German Neolithic written just before the start of the first World War, attributed to the Michelsberg culture an autochthonous origin out of local Mesolithic peoples in the Alpine area, joining once again Michelsberg and lake dwelling pottery. The idea found wide support a nd was repeated in modified form by Buttler[4] and Bremer[5]. Childe[6], however, recognised that, in addition to parallels with the western Neolithic, there is a strong connection with the Danubian cultures in some of the pot forms, and he proposed that the Mesolithic population of the north Alpine region was the source of the Michelsberg culture through acculturation by contact with Danubian farmers. This idea was recently

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[1] Schuchhardt 1910.
[2] Schliz 1913.
[3] Schumacher 1913/15.
[4] Buttler 1938.
[5] Bremer under Michelsberger Typus in Ebert, Reallex.
[6] Childe 1929.

reiterated in an influential paper by Mildenberger[1] which appeared at almost the same time as the publication by Vogt that inspired the recent debate[2].

To Vogt[3] we owe the clear distinction which is now drawn between the Michelsberg and the Cortaillod cultures, a distinction which cleared up the considerable confusion resulting from lumping together all the cultures in the Alpine lake area under the name of "Pfahlbaukulturen" and linking them indiscriminately with those along the Rhine to the north. Unfortunately, Buttler did not seem to realize the importance of this separation, and it tends to be blurred in his oft-quoted survey.

An attempt to resolve the apparent two-fold character of the culture, apart from the earliest attempt of Schumacher, was made by J. Hawkes[4] who spoke of its hybrid western-Danubian character, an idea more recently elaborated by Bailloud[5]. Grimm[6] independently proposed that this hybridization took place between western and northern cultures.

The idea that Michelsberg is northern in origin actually has a longer history than is usually suspected. Evidence for this is already present in the second of the early papers of Reinecke[7], and this was restated by him some thirty-four years later in a short note[8] which appeared during the war. At almost the same time, Benesch[9] proposed

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[1] Mildenberger 1953.
[2] Vogt 1953.
[3] Vogt 1934.
[4] Hawkes 1934.
[5] Bailloud 1952/55.
[6] Grimm 1937.
[7] Reinecke 1909.
[8] Reinecke 1942.
[9] Benesch 1941. I have not been able to see the unpublished dissertation by Maas, 1941.

the adherence of the Michelsberg culture to the northern group, as a consequence of his excavations on the Hutberg where he found allegedly Michelsberg material in close association with members of the central German Neolithic family. He suggested that the origins of the Michelsberg material lay somewhere in Westphalia, Holland or Belgium. This proposal was not so new for Rademacher[1], as early as 1913, had tried to derive the pottery from the megalithic ceramics of north Germany and proposed that the culture moved up the Rhine from north to south.

Von Gonzenbach[2], in her study of the Cortaillod culture, proposed that the origin of the Michelsberg material surely lay outside both the Danubian and western areas, and Vogt[3] at nearly the same time pointed out that the culture comes up the Rhine rather than expanding downwards, as stated by Schumacher and his followers. Tackenberg[4], on the other hand, saw the culture as a separate group from the western area pushing into the Rhineland at the end of the third millenium with western elements dominant.

In a short paper, Vogt[5] consolidated his argument and stated that he challenged someone to show why the culture should not be considered as an outlier of the funnel-neck beaker (TRB) family. Becker[6] a year later, following finds at Store Valby, unreservedly attributed

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[1] Rademacher in Bericht der Kölner Anthropologischen Gesellschaft 1913. I quote Muller 1953 since the original was unavailable to me.

[2] Von Gonzenbach 1949.

[3] Vogt 1950.

[4] Tackenberg 1950.

[5] Vogt 1953.

[6] Becker 1954a.

the Michelsberg culture to the northern group of the TRB family. On this basis, a whole spate of articles[1] re-evaluating various Neolithic groups in relationship with Michelsberg appeared. Much of the debate seems loosely based to the writer, largely because of a lack of uniform agreement as to what exactly constitutes the Michelsberg culture. Therefore, it was decided to re-examine as much as possible of the original material at first hand and see if a more accurate definition of the culture could be achieved.

Regional Groups in the Michelsberg Culture[2]

It was impressive, in a short period of time, to see the variety of material which has been called Michelsberg; yet a remarkable unity could be seen within distinct geographical areas. It was tempting to call these regional groups separate cultures with different names, but relationships between adjacent groups were so strong that this seems inadvisable, even though widely-separated groups look utterly unlike one another.

Michelsberg regional groups[3] are located in: Belgium: the Rhineland and North Hesse; South Hesse, North Baden and part of Württemberg, a group which includes the typesite and which I shall call Classical Michelsberg; southern Alsace and South Baden; the South Rhine and the Bodensee; and, finally, Northern Bohemia in the Ohře and Elbe valleys. Some finds of supposed Michelsberg material

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[1] Among others: Piggott 1955; De Laet 1956; Baer in a forthcoming MUFS; Hinsch 1955.

[2] One should speak of tendencies to grouping, rather than of groups in the hard and fast sense, for the nature of the archaeological record is such that one has only a very coarse picture of what must have been a detailed and complex series of related communities. The fragmentary remains blur outlines and cause sharp differentiation to disappear.

[3] See Distribution Map in Appendix I.

from central Germany, the Paris Basin and Brittany are too questionable to be included, though they will be mentioned briefly later on. In some areas the culture lived long enough so that distinct differences appear among assemblages from nearby sites, differences which when repeated in other areas must have chronological significance.

In discussing the data, each ceramic form will be given a number running serially in each regional group, for the types are uniform enough to allow this. A type will be termed common when it occurs three or more times, infrequent when found twice andrare if only a single example exists. Rare types are included for completeness, but only when found in clear assemblages of known types. It would be misleading to give histograms with actual percentages of each type, for so much material has been destroyed during the last war, especially at Köln, Bonn, Koblenz, Bruchsal, Karlsrühe, Stuttgart and Strasbourg, that we cannot be certain that what survives is entirely representative. All one can present is an impression based upon a rough evaluation of the remaining material. Isolated finds of atypical form which have been attributed to Michelsberg by various authors will not be discussed[1]. The regional groups (with the exception of the Belgian group discussed in Chapter VI) will be discussed separately and geographically from north to south, a direction dictated purely by consideration of increasing complexity rather than by any implied theory of movement of the culture.

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[1] The elementary statistics proposed here seem to be in keeping with the quantity of finds. The results are summarized graphically for the chief types occurring in more than one region in a chart, figure 64, which is discussed later on.

The Rhineland-North Hesse Group

This group has a richer variety of pot forms than does the Belgian group (see figure 45). A pseudo-tulip beaker from which the Belgian equivalent forms probably derive appears with a variety of profiles, forms 13 a-d. They tend to be more slender than the Belgian examples. A very wide pot, forms 8 a-d, often with a small rim either flaring slightly outwards or with a smooth S profile and a body which is wider than it is high, appears commonly. It derives from Chassey types, figure 62, nos. 16 and 23. Storage jars of form 15, with finger-tip ornamented rim and a pronounced kink in the profile are very common, though few whole ones have survived destruction in the various museums visited. The globular jug, form 6, with a row of tube lugs around the lower portion of the belly, the ancestor of the pot of figure 44, no. 5, is found in most of the sites in the region in varying sizes[1]. As forms 16 and 17, the globular jug without tube lugs occurs infrequently. The broad-handled ladle of form 4 occurs only at a few sites which also produce the handle jug of form 7. The shallow bowl with round bottom of form 11 is reminiscent of a Chassey type, figure 62,no. 17, and it appears frequently like the related small hemispherical cup of form 12. Form 9 is a rare bag-shaped pot clearly related to unornamented Rössen types. Also unusual is the large storage jar of form 14 which has a globular body and high neck ringed with six rows of relief ornament. A direct parallel in the Chassey culture is typified by figure 62, form 6, and another

[1] Ranging from the one illustrated by Buttler 1938 from Mayen, Mayen Museum #763, which is only 22 cm. high, up to about 36 cm. high.

example is known from the Classical Michelsberg, figure 47, form 18 as we shall see.

A small, handled spherical cup, form 1, as well as a curious pot with sinuous dot ornament, form 5, both of which may occur in Michelsberg contexts, seem quite late. Parallels for the ornament of form 5 have been found[1] in the Adlerberg culture, but the shape of the pot, to the writer's knowledge, has no exact analogy. Another rare type, form 3, has a pronounced break in the profile and a slightly flaring neck. It is made in highly burnished black paste untypical of the Rhineland, with very thin walls. An exact parallel can be found in Alsace[2].

Very large "baking plates", form 2, sometimes as much as 45 cm. in diameter, occur in the Rhineland. The average size exceeds that in all other regions. Almost all have turned up rims with finger-tip ornament and a well-smoothed surface. It seems likely that the underside is deliberately roughened. If, as the writer believes, these plates are really pot covers for the larger storage jars[3], then it is likely that the smoothed side was placed facing inwards over the mouth of the jar, while the roughened outer surface matched the scraggy slip coating on the outside of the storage jars. Similarly, the finger-tip rim ornament matched the rim ornament of the storage jars. The large size in the Rhineland is paralleled

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[1] Muller 1953, who points to the cup from Weis, Neuwied Museum 2986-a, found with an Adlerberg culture pin, as having similar ornament. About a half-dozen of these pots are in the study collection at Bonn.

[2] Forrer 1922, fig. 21h from Lingolsheim, now lost.

[3] The fact that a certain percentage of "baking plates" have been subject to secondary firing as noted by Schmidt (in Maier 1958) is not in itself a proof of use as a baking plate. In general, a certain number of "storage" jars have also been subject to secondary firing, and it is not unlikely that some of these pots, particularly the smaller ones, were buried in hot coals, with the "baking plate" as a cover, for cooking or, more likely, pot roasting.

by the size of the scraggy-coated storage jars, though insufficient numbers are available to check this statistically.

Rhenish paste differs from the Belgian in the almost universal use of a fairly coarse quartzite gritting and in a higher firing temperature in an oxidizing atmosphere which produces pots of a dull red-brown or orange color. Burnishing of the finer pieces is well-executed though, with few exceptions, it is not up to the standard of the classical area. Grain imprints are common. See Appendix II.

The implements of the Rhineland group, because of the absence of native flint, are almost entirely made of imported materials[1]. Apart from the few Belgian examples which we have already discussed, the majority emanate, as far as axes are concerned, from two sources. One is the mining region around Aachen[2] with a definite factory located on the Lousberg[3], and the other is in the Luxembourg region with no known factory center[4]. The first of these produces axes in a gray-brown banded flint in forms rather reminiscent of the Belgian types, though they are usually shorter and the long profile is usually more swollen. The Luxembourg flint is usually caramel brown[5] in color, and

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[1] The term "import" is used merely in the sense of "coming from another place" and not in the sense of trade. Jahn 1956 has outlined some of the perils inherent in thinking in terms of trade with regard to this early period.

[2] Brandt 1941.

[3] Liese 1930.

[4] Schmitt and Dehn 1938.

[5] It is not unusual in the older literature to find any brownish flint referred to as a Grand Pressigny import. Not all brown flint, by any means, comes from Grand Pressigny. It has been shown that there is an inclusion of minute specks of mica in Grand Pressigny flint which, when it appears, may be taken as characteristic. None of the pieces of brown flint, either blades or axes, examined by the writer throughout the entire Michelsberg area have these characteristic inclusions. The only find of a certain Grand Pressigny piece in connection with a Michelsberg site is a typical bifacially flaked dagger found at Spiennes in 1864 and at present in the private collection of A. Houzeau (grand-nephew of the A.Houzeau who participated in the original publication of Spiennes). This dagger includes the required mica flakes, but, unfortunately, the circumstances of its discovery are not clear. It was found on the surface near the location of the most famous mines, during some earth-moving operations, but the exact context is not known.

the forms are much the same as the Aachen types. The catalogue of scrapers, blades and the like is undistinguished, representing a few of the types available in Belgium and mostly rather poorly worked. Long blades do not occur in definite Michelsberg contexts. Arrowheads are usually triangular with straight or concave base. Bone tools survive rarely in the rather acid soils of the Rhineland.

Thanks largely to the activities of Lehner, Könen and Röder, we know more about the settlement forms and house types in the Rhineland than in the Belgian group[1]. It seems clear that the villages were fortified with a system of banks, ditches and palisades, ranging from a simple bank and ditch with palisade at Gering or Miel, to the spectacularly complicated construction at Urmitz with double banks, double ditches, palisade, palisade trench and very complicated systems of gates[2]. Mayen is rather intermediate in complexity[3]. It seems doubtful that these camps can be considered as related to the causeway camps of southern England for their defensive character is obvious, and the presence of numerous houses within would clearly tend to mark them as villages. However, there is considerable evidance that the villages were at first unfortified[4] for, both at Urmitz and Mayen, the ditches of the palisade trench cut through house foundations of an earlier phase. The chronological implications of this fact will be discussed shortly.

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[1] Lehner 1922, Lehner 1916, Lehner 1910b, Lehner 1910a, Lehner 1903, Konen 1899, Röder 1951; also an unpublished flat-bottomed ditch cut by one of the major quarries near Niedermendig, which Dr. Röder showed me in 1955.

[2] Behn 1919/20.

[3] Lehner 1910b.

[4] Lehner 1922.

Houses are almost uniformly of simple rectangular type, averaging about 3 by 5 meters with four corner posts for support of a simple roof. Occupation of each site extended over a sufficient period for the outlines of earlier houses to be cut by later constructions[1].

Burials which can with certainty be attributed to the Michelsberg culture are unknown in the area, though this may as much be due to the lack of preservation of bone as to anything else, for isolated finds of groups of intact pots may be remains of burial groups[2].

On typological grounds, Muller proposed[3] a three-phase division of the Rhineland group. It certainly seems clear that the material belonging to the period of fortification of Mayen differs from that of the open settlement there, or at Urmitz. Furthermore, as Bersu pointed out[4], the finds from the Altenberg at Niedenstein belong to a very well-developed Michelsberg and do not represent a degenerate phase. The Altenberg material matches some of that which we shall discuss for the Classical group while, at the same time, containing elements present at Urmitz. Hence, three phases in the Rhineland-North Hesse group are discernible, characterized by the Altenberg, Urmitz and perhaps unfortified Mayen, and finally the fortified phase at Mayen. Since we know that the fortifications at Mayen are later than the settlement, we have the order of development. We are rather tempted to doubt Muller's attribution of the late Mayen phase to a time parallel with the Adlerberg culture,

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[1] Lehner 1922.

[2] Muller 1953 who cites Kärlich, Bonn 18634; Kessig, Koblenz 5249; Urmitz, Bonn 15547; Emmerich, Bonn XXX, Kreuznach 504, 1063, 632.

[3] Muller 1953.

[4] Bersu 1928.

for the dot ornament on the pot of form 5 seems very weak evidence on which to base the assumption. Such dot ornament is not unknown in other groups of the Michelsberg culture to the south, as we shall see. In any event, the Belgian group, which shares many forms with the Mayen fortified phase, is certainly later than the other two periods in the Rhineland.

The Altenberg phase is characterized by the presence of a pot form which we shall discuss in connection with the Classical group, figure 46, form 1a. But in this area pots of form 6, figure 45, are also present and that parallels the phase with forms occurring at Urmitz. The Urmitz phase is typified by surviving rare handled jugs, the infrequent broad-backed ladle, slender, slightly-carinated tulip beakers, and Rossen-like forms which are not present in the Mayen assemblage. The Mayen phase includes the very wide-mouthed pot related to the Belgian assemblage and the pots of form 8. The handle jug, the ladle, the slender beaker and the Chassey-related bowls are all absent at Mayen in the fortified phase.

In relation to other groups, it is reported[1] that the ditches of Urmitz cut Rossen graves, and that they had Schnurkeramik sherds and one Beaker arm shield deep in their infilling. Form 13b was found in primary position in the Urmitz ditch. Perhaps the fortification of sites in the group is related to the Schnurkeramik invasion.

The Rhineland group has an area of distribution which includes most of the course of that river from the bend at the Moselle junction (Koblenz) right up to Köln.

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[1] BJ 148 1948 340 and Muller 1953; Bonn 14007, arm shield.

Scattered outliers north of Köln are few[1]. Penetration up the Lahn, Eder and the Wahn may account for the settlement in the Kassel area, though this part of the region may also have had direct colonisation from the Classical group via the Nidda and the Eder. The greatest density of sites which have been discovered lies in the triangle Koblenz, Andernach, Mayen--discovery due to the extensive exploitation of the thick deposits of volcanic pumice and tuffa overlying the area.

The Classical Group (South Hesse, North Baden, Western Württemberg)

There are many more pot forms in the Classical area than in the two groups to the north (figures 46-48). Tulip beakers, forms 5 a-k, in the usual meaning of the word are now very common. Occasionally they are ornamented with lugs or simple stroke ornament. The lugged types are possibly to be derived from similar pots from the Chassey culture, especially some pieces from Monmorot, figure 62, no. 5, which closely parallels a lugged type in the Darmstadt museum, form 5i. Very common too is the necked flask of forms 1 a-d which, in contrast with the Rhineland and Belgian equivalents, is usually entirely without tube lugs. The single lugged example shown, form 1b, was found with a flaring-mouthed tulip beaker of form 5c and a unique flask of form 1d[2]. The whole combination is exceptional within the Classical area, though it would not be out of place in one of the later Rhineland phases. A

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[1] See Distribution Map and accompanying table.

[2] Paret 1930/2 and Paret 1935/38 for complete description of the finds and other pieces not shown here.

common variant on the necked flask, form 1a, has a large coil of clay around the pointed base which is pierced vertically 40 times, presumably for a network of string over the body. The number of holes, curiously enough, varies scarcely at all from one example to another over the entire Classical area where the type is found in almost every site as well as in the South Rhine Bodensee group (see figure 56, form 32a). Bersu[1] correctly pointed out that this type is as characteristic of the early Michelsberg culture as the slender tulip beaker. The presence of this "cordon multiforé" is another connection with the Chassey culture, figure 62, no. 26, though the Chassey version does not normally occur on a flask of this type. This flask with 40-hole cordon is the Classical area functional counterpart of the tube lug flask in the Rhineland and Belgian groups, as well as in the Alsace group.

Rare types include the pot of form 4 which is now lost, or type 5d which comes from a site very near the Michelsberg itself and, though several examples are known[2], it is unique at that place. Ornament on the base or under the rim of the slender tulip beaker like that seen on form 5e is not infrequent and up to four grooves impressed into the paste is the usual motif[3]. Simple baggy shapes occur sometimes with slightly S-shaped profiles like forms 2, 3a and 3b. The last of these also has direct parallels in the Chassey culture.

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[1] Bersu 1928.

[2] All the examples from the Auberg with the exception of the one illustrated, a new find, were destroyed in the bombing of the Bruchsal museum. For illustrations and description see Wahle 1925.

[3] Other examples of this ornament: Schierstein-Wiesbaden Museum 18.104, Karlsruhe, inventory no. lost, but see Bonnet 1899, pl. V, no. 15 and compare with figure 50, type 9a, in Alsace.

"Baking plates", form 15, are numerous. They tend to be rather a bit smaller than the examples to the north, averaging 25-26 cm. in diameter and about 1.5 cm. thick, and finger-tip ornament is general. Other types of edge treatment include rows of dots, wedge impressions, stroke ornament and occasional plain rims. In several examples, impressions of spirally-braided cord mats can be seen on the rough side[1]. In the South Rhine group, one example with a rectangular reed mat impression occurs.[2]

Storage jars of forms 19a-c are present in a wide variety of sizes, often reaching very large dimensions. The scraggy slip finish is common, as are finger-tip-impressed rims and the pointed bottom. The larger class of pot usually has the S profile seen in the Rhineland, while the smaller types are simple sack shapes. Most of the surviving "baking plates" would appear to be designed to serve as covers for the latter group, form 19c, since average mouth diameters and "baking plate" diameters correspond closely with many examples of both available for consideration.

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[1] Examples include Mainz Stadt Museum 27,31,1--Vendersheim; RGZM cast 20,896--Schierstein; Wiesbaden 18,76--Schierstein; Alzey N2,13--Neubamberg; Bruchsal new find, Michelsberg, 22 cm. diam. no no.; Gross Umstadt (formerly in Darmstadt museum), see Behn 1925; Glauberg; see Richter 1934. A similar mat imprint occurs on the underside of a very large flat-bottom carinated bowl from Heidelsheim kr. Bruchsal, at the time of writing unpublished, in the possession of the Denkmalpfleger, Karlsruhe. Another occurs on a Munzingen sherd (See Maier and Schmidt 1958).

[2] From Weier-Thayingen kt. Schaffhausen, Schaffhausen museum no. 1895, and illustrated in Sulzberger 1924, pl. 13, no. 8. A spiral mat imprint occurs on one plate from Weier, Schaffhausen 7969.

Storage jars with lugs of form 17 occur at some sites, including the typesite, and these of course have identical counterparts in the Chassey culture, figure 62, no. 13, for example. They differ from the Chassey prototypes in the frequent application of the scraggy slip characteristic of many Michelsberg storage jars. Classical group storage jars differ sharply from those in the South Rhine group in the shape of the bottom, as well as in profile. Only the scraggy slip and finger-tip-ornamented rims are shared. Hemispherical bowls and cups of forms 12 and 13 are common and exist in a wide range of sizes. Small cups of forms 9 and 10 appear also in rare variants with different kinds of lugs, one with vertically-perforated tube lugs, another with small perforated rim protrusions. Forms 9 and 10 have exact parallels in Chassey, figure 62, nos. 13 and 22. Forms 8a[1], b and c, on the other hand, seem to derive from TRB or Jordanów shapes.

The handled jug of forms 6a-d appears in the Classical group only at or near the typesite. Two basic types exist, one of form 6b with a smooth rounded profile, and one of form 6d with a pronounced kink. No chronological significance can be attached to this[2]. The jugs of types 6a and c are rare pieces from the typesite having no parallels elsewhere in the Classical group. Chassey ornament (and not Schussenried as stated by some authors--see figure 62,no. 24) is applied by incision before firing. Form 7 is a rare type of handled beaker with S. profile and

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1 First identified by Dauber 1940.

2 Though Reinerth 1923 attempts to show that the smooth type is later.

flat bottom also from the typesite and, while it has no parallels in the Classical group, some are known from the South Rhine region[1].

The pot of form 11 from Schierstein is unique in the Classical group, but another occurs in the South Rhine group, figure 54, type 8, and the type is known in Chassey, figure 62, no. 12. Parallels with the lugged flasks of the Baalberg culture, figure 63, no. 8, can also be used to infer that the type has a very wide distribution.

The piece from Büttelborn, form 18, has already been mentioned in connection with a similar pot in the Rhineland, but it may be noted that the Classical piece is much closer to the Chassey prototype, figure 62, no. 6. It is ornamented with two rows of relief ornament like its counterpart, but it has a series of stroke impressions around the rim which is most characteristic of certain unornamented Rössen pots, like that of figure 63, no. 11 or 12.

The curious pot of form 14 (two come from the typesite) has a series of lugs running round the shoulder and a very heavy overhanging rim with undercut impressions. The rim type has many parallels in both the TRB and Jordanow cultures (see figure 61, nos. 4a and b, 13) while the row of shoulder lugs is a typical unornamented Rössen feature, figure 63, no. 13 or 14. But the two are not combined in any single pot, to the writer's knowledge.

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[1] See, for example, Kraft 1929, fig. 1, from Altenberg kr. Waldshut, p. 20.

An important class of pot which exists in great variety is the flat-bottomed carinated bowl of figure 48, forms 23a-f. Types range from simple large bowls with sharp profile rim rising vertically from a conical body to the same form in a somewhat shallower model with greater degrees of rim flare, and sharply-profiled bowls with horizontally-perforated lugs at the break in the profile which, except for the peculiar indentation of the base, are identical with Chassey types, figure 62, nos. 15, 19, 20, 21 and 23. A carinated, nearly hemispherical bowl with flat bottom form 23d, with tiny vertical perforations around the rim for string suspension and often with dot ornament around the rim tends to remind one of Schuchhardt's leather prototype theory[1], even to the stitching of the seams.

The conical flat-bottomed bowl of forms 25a-c is most common in the Main valley where it has a number of variants; some with perfectly straight sides; some with slightly flaring sides; some with two or four lugs horizontally perforated disposed around the middle; occasionally with rows of dots connecting adjacent lugs like garlands. Several parallels for this type exist in the Alsace-S. Baden group, see figure 51, no. 12b. Both the lug types and the dot garlands are Chassey or S. French features[2]. Rarely, the conical bowl is very low, widely flaring and almost straight-sided like form 24.

A pot which appears frequently only in the Speyer area, though it has a counterpart in Alsace (figure 49, type 1), is a flaring-mouth, bomb-shaped pot, sometimes with

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[1] Schuchhardt 1926.

[2] Arnal and Burnez 1957 in discussion of relief ornament, p. 75.

a row of horizontal tube lugs beneath or at the belly, in manner reminiscent of the necked flasks with lugs in the Rhineland. The broad-handled ladle, form 22a-c, exists in great numbers. It is sometimes ornamented with strokes around the rim or across the inside of the handle. Frequently, there are two small perforations for string suspension a bit below the top of the grip. Handles are usually uniform and rounded, and in two instances[1], traces of the coils of clay which were used to build it out from the body can still be seen, for one appears never to have been fully burnished.

A feature which sharply differentiated the Classical group from those to the north is the frequency of flat-bottomed pots. This is probably significant only in that it indicates a higher level of development of ceramic technique, a quality also evident in the paste. In contrast with the northern groups, it is often very fine, beautifully burnished, polished in the better pieces to a mirror shine, hard and fired in an oxidizing atmosphere to a characteristic red orange. In the northern and western part of the group, lighter yellow browns sometimes appear. The paste is to be contrasted with that of the Rhineland for its fine technique. All traces of gritting are usually well suppressed by careful burnishing, but when visible in fracture rolled quartzite seems to be preferred. Technique of wall thinning and surface treatment approaches that of the finest Chassey and is much better than that found in contemporary cultures to the east. Grain imprints occur commonly. See Appendix II.

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[1] Wiesbaden Adolfshöhe-Wiesbaden Museum 13.235; the other from the Goldberg near Nordlingen, Stuttgart Museum G 1748/351/G58 retains the coiling as a decorative motif.

Stone implements from the Classical group are difficult to study because of the loss and dispersal of some of the most important collections, including those from the typesite itself. What survives presents a slightly different picture compared with groups to the north. Arrowheads now appear in about equal number with simple triangular and concave based forms. No other type except the rudimentary tanged kind is of much importance. Small imported flint blades appear occasionally but it is not possible to determine their source. The horseshoe scraper is likewise found, though much smaller in size than those to the north. This whole pattern points to the lack of good flint. The axes confirm the fact. Pebble axes predominate and flint is very rare. Those with an oval cross-section determined by the natural form of the stone are most frequent, though a sub-rectangular cross-section is also encountered. The first antler sleeves for hafting are encountered south of the Main. Antler implements survive rarely, but some types such as the peculiar double tyne perforated rake from Neubamberg[1] still tends to show a connection with the north. Identical pieces are known from Spiennes and Obourg[2] and it appears to be a common type in the entire flint-mining region. Simple bone or tooth pendants common in the South Rhine group appear sporadically. Soils are more favorable to the preservation of bone southof the Main and, if more of the excavated material were available, it might be possible to fill the gap in our

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1 Behrens 1927, from Neubamberg, in Alzey museum.

2 Piggott and Clark 1933, type 2b; De Munck 1886; and Chapter VI.

knowledge of the types lying between the well-preserved material of the South Rhine group and that of the Belgian assemblage.

Settlement forms are not too well known from the area where the predominant loess cover is often so strongly lehmified that only the bottoms of rubbish pits are identifiable. Ditched and banked camps are known from several sites[1], the usual form being a simple flat-bottom ditch with inner bank. Excavations at the Michelsberg in recent years[2] have not disclosed any palisade trench. Here, the bank and ditch bars only the easier slopes of the hill, while the steeper side appears to have been unprotected. The type is not quite that of an "éperon barré" however. The enclosure at the Goldberg has not been published, and house types from the Michelsberg occupation there are not discernible[3]. Ehrenstein, recently excavated, shows smallish houses with log floors and a regular arrangement in parallel rows of dwellings[4]. It is unfortunate that some of the sites were excavated before techniques were adequate to cope with the problems of house plans, etc.

The bulk of the material belonging to the Classical group has a very compact distribution area centered on either side of the Rhine from the junction with the Main down to Karlsruhe, with a subsidiary group spreading down the Neckar and its tributaries and making contact with the

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[1] See Schumacher 1921 for a list; plus Bonnet 1899 for the plan of the Michelsberg.

[2] Dauber 1951.

[3] Bersu 1936, 1937 publishes only the Rossen and Altheim house plans and, in conversation, says that the Michelsberg plans could not be disengaged from the others, though the rubbish pits of that occupation could be readily distinguished.

[4] Paret 1955.

upper reaches of the Danube and its tributaries as far east as Ulm. An extension up the Main as far as Tauberbischoffheim can be traced and, judging from the position of the Bohemian group beyond the headwaters of the Main, material may one day turn up throughout the Main valley. Outliers of the Classical group appear rather unexpectedly at Salzburg in Austria and near Erding in Bavaria.

No burials are known, with any certainty, from the Classical group. The disposal of bodies by throwing them into ordinary rubbish pits has been attested at the Michelsberg, but this is rarely enough encountered for it not to have been a regular procedure[1].

The bulk of the Classical group is very uniform, and types differ little from one site to the next. Exceptions appear in the Speyer area and in the Neckar valley, as well as in some sites near the junction of the Main with the Rhine where types similar to those of the Urmitz phase begin to make their appearance. The earliest phase of the Classical group contains the lugged tulip beaker, the forty-hole "cordon multiforé" jug, the slender, smooth-profile tulip beaker, the handled jug, the lugged, baggy storage jar and the indented-bottom, carinated bowl with lugs along the break in the profile. The second phase

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[1] My thanks to Dr. Dauber who has kindly shown me photographs of his recent excavations at the Michelsberg, where one of these pits was encountered. Contrary to the reports of Bonnet 1899 and Schumacher 1921, these pits are not deliberately lined, for what was found was merely a chemical change in the loess causing it to concentrate calcium salts in the walls of the pit. The human bones were mixed in with cattle and other animal bones in a careless way and not placed in the pit as shown by the early sources.

It is not possible to accept the recent publication by Zürn 1957 of a barrow burial, allegedly accompanied by a Michelsberg flat-bottomed carinated bowl. Examination of the find in the Stuttgart museum shows that the type does not correspond with other bowls in the Classical group or in any other group, for that matter. Dr. Hundt of Mainz, in conversation, states that the type is more at home in the so-called "steinkammergrab" group.

includes the belly-lugged, wide-mouthed pots of the Speyer region, the tube-lugged, necked flask and wide-flaring tulip beaker with sharp break in profile from Neckargartach. Intermediate between the two are the sites from the Main valley, like Schierstein, which include some break-profiled tulips and some smooth ones, many conical bowls with flat bottoms and very large storage jars approaching the Rhineland types. The order of these phases is based upon the material in Alsace which is to be discussed next.

The only certain stratigraphy for the Classical group occurs at the Goldberg[1] where the Michelsberg occupation, in type corresponding to the early phase, is overlain by the late Altheim material and, in turn, cuts into the Rossen remains below. The reported stratification of the Glauberg near Budingen[2] with Rossen houses cut into a Michelsberg occupation layer is incorrect according to several competent observers[3] who saw the original (largely unpublished) excavation.

On the basis of the ceramic forms, the closest comparison for the Classical group can be found in the later phases of the Chassey culture in Burgundy, even including prototypes for the tulip beaker and perhaps for the baking plate. If the Chassey culture can be divided as Arnal suggests[4], then early Classical Michelsberg, the phase which has the closest analogies with Chassey, must be contemporary with the transition from Chassey A to B. Types

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[1]Bersu 1936, 1937 and Buttler 1938.

[2]Richter 1933, 1933/4.

[3]Both Prof. Bersu (who visited the site) and Dr. Jorns (who spent a month working on the excavation) state that the Rossen and Michelsberg material do not occur in stratified relationship.

[4]Arnal and Burnez 1957.

in Classical Michelsberg derived from northern cultures are relatively few and rare (perhaps forms 8 and 11). Types derived from Danubian contexts are more plentiful, the necked flask probably being Rössen in origin (see figure 63, no. 13), while the handled jug probably comes from Jordanow via the Schussenried culture, as we shall attempt to show when discussing the latter. It is possible that the flat-bottomed, high, carinated bowl with slightly curved sides, form 23e, is also derived from this source. The presence of Schussenried and Rössen forms in the Classical group is hardly surprising considering that these two cultures occupied the area prior to the Michelsberg settlement. It is reasonable to suppose that some members of these groups, perhaps female pot-making captives, were assimilated by the newcomers.

The Alsace-South Baden group

In Alsace, we find several assemblages: one typified by Aschenheim, Hohnheim, Strasbourg-Gare, and clearly related to the early phase in the Classical group, phase I; another typified by Lingolsheim, Schiltigheim, Leiselheim, with forms approaching the Main valley groups and the Urmitz phase in the Rhineland, phase II; a third aspect at Mundolsheim which is closely related to finds from Munzingen, etc., in South Baden, phase III; and, finally, finds from Cronenbourg, Handschuheim, Kleinkems and other places, phase IV. The four subdivisions occur in a very restricted area and can only be chronological. It is proposed to extend this four-fold division to the whole of the Michelsberg culture, and we shall use the concept as

a working hypothesis, subject to revision through detailed study of individual assemblages. Detailed study of extant material is hindered by destruction of material in Strasbourg, Freiburg and Karlsruhe.

The pot forms of the group are illustrated in figures 49-51. A variety of flat-bottomed bowls, forms 6b, c, d and e, are present. Form 6e is related to the Classical Michelsberg and comes from one of the sites of phase I. Forms 6a and d, belonging to sites of Phase III, are more rounded and softer in profile, often have involuted rims, horizontally perforated lugs or, as in form 6b, have vertically perforated tube lugs. Profiles degenerate completely in Phase IV which is only tenuously linked with the Michelsberg culture because the pot of form 5b was found with the Cronenbourg assemblage. Since form 5b appears in Phase II and is characteristic of Phase III sites, it is probably but barely included in the Cronenbourg assemblage. In Phase I, the type corresponding to those of Classical Michelsberg, form 3, predominate. This necked flask without a ring of tube lugs or with a "cordon multiforé" is carried over in a degenerate flat-bottomed form and short neck in Phase II and III sites, as form 2.

Hemispherical bowls of form 7 are common at all sites except those of Phase IV. Rare types in Phase IV include form 4 though, in general, the forms of this phase tend to resemble pots of the early Bronze age[1]. The pot of form 1 from Lingolsheim, which we have attributed to Phase II,

[1] As remarked by Goehner 1939. The attribution by Lais 1948 of all of the Kleinkems pots to the time of the older Cortaillod culture cannot be sustained for the comparison with the late Alsace sites is too striking.
Form 6d from an isolated burial at Wolfenweiler (see Maier 1958, p. 20) is only tentatively assigned to the group. It is most closely related to form 24b which is discussed below.

has counterparts in the Speyer area as noted in the discussion of the second phase sites of the Classical group. Further, form 8 from Lingolsheim, is to be compared with the pots from the Urmitz and unfortified Mayen phase in the Rhineland. This, in effect, places the main Rhineland phase at a time parallel with Alsace, Phase II, and Classical group, Phase II.

Aschenheim and Hohnheim, as well as a number of minor sites, have furnished slender tulip beakers of forms 9a and c which have direct counterparts in the Classical group. Some are ornamented with lugs, form 9c, which makes the pieces directly parallel with figure 46, form 5h, from the Michelsberg itself and, by extension, relating Phase I with the Montmorot types in Chassey as well as with the Gross Umstadt piece, Classical form 5i, and Ehrenstein, Classical form 5j. All are hence Phase I.

On the other hand, tulip beakers of Phase II and III have a more pronounced knick, typified by form 9b, relating them to northern Classical form, figure 46, form 5k, in the Main valley and hence, too, to the types from the Urmitz phase in the Rhineland. Beakers found at the Camp de Chassey[1] itself also belong to this group. Cronenbourg and a number of the later sites both in Alsace and S. Baden have no tulip beakers at all. Instead, the functional equivalents are the funnel beakers of forms 11 and 12. The widely-flaring tulips of late Phase II date the site at Neckargartach discussed with the Classical group, confirmed too by the presence of the necked flask with belly tube lugs.

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1 Musée d'Hotel de Ville, Roanne. I am indebted to Prof. Piggott for showing me his unpublished drawings of this find.

Large storage jars, forms 16a-e, exist in many sub-variants. Form 16e has a plain baggy shape reminiscent of types in early Chassey and Classical Michelsberg, thought[1] it is not confined exclusively to the earlier phases. Examples can be found at sites in phase III (Munzingen). In the later examples, forms 16c and d, the tendency to a scraggy slip is pronounced, as is one toward the introduction of rim lugs and a flattish bottom. The multiple-lugged, pointed bottom storage jar of form 15 from Mundolsheim is a rare piece, but it has a single parallel in the S. Rhine group and cannot be considered as typical of Phase III[1].

Baking plates, form 13, are common in the first three phases and appear, though infrequently, in the fourth. They tend to be quite small in Phase I and part of Phase II, reaching larger sizes in late Phase II and in Phase III.

Cronenbourg has flat-bottomed storage jars with bulging profiles of form 14 as well as high jars of form 10a which resemble SOM or Horgen types and are perhaps contemporary with them. Neither seems suitable for the type of cover represented by the baking plate[2].

Two types peculiar to Alsace and South Baden are forms 18 and 25 with flat bottoms and rim lugs. They appear in Phase III only, and parallel a tendency seen in the storage jars of that period.

The handled jug is extremely rare in the whole area, only one example--form 21--surviving from Lingolsheim and hence early Phase II. This is equivalent to the presence of a handled jug from Urmitz in the Rhineland

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[1] Henning 1912 shows that it was found with a pot of Rossen-like form of a type which occurs in other finds with stroke-ornamented sherds.

[2] Form 10b, the functional equivalent of this type in South Baden occurs in the late site at Munzingen and elsewhere. The rim bosses are typical in the South Baden finds and less common in Alsace.

which we have also assigned to phase II. For reasons which will become clear further on, it would be useful to think of Alsace Phase I sites as among the earliest of the Michelsberg culture, too early to have acquired the handled jug from the Schussenried culture.

The ladle is present in all three phases, though the earliest--forms 20b and c--from Phase I sites, are related more to the Chassey spoon figure 62, no. 8. In Phase III the form degenerates to the barely perceptible handle of form 20a. Hence, we deduce that the ladle with broad round handle is introduced in Phase I and continues on until the end of Phase III, though it does not appear in all sites of this last phase.

Conical bowls are infrequent. The three examples from the group all have dot ornament or lug garlands, forms 17a and b, linking the pieces with the type from Schierstein previously cited, figure 48, form 25c. The type thus occurs in sites of late Phase I and Phase III. It seems to be absent from the assemblages of Phase II but this may be accidental.

The small hemispherical cup, form 19, is common, while rare types include the four-lugged bomb pot, form 22, which is a pure Chassey type. Forms 24a and b have parallels only in some eastern groups--form 24b nearly identical with central German Jordanów types[1]. The pots with ornament of forms 23 a-c are interesting as examples of Chassey bomb pots with ornament which, in the case of 23a and b, may be closely paralleled in the Schussenried culture except

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[1] See Buschendorf 1951, p. 20, fig. 2a.

for the relief disks around the neck--a Chassey motif[1]. We shall try to account for this when discussing the Schussenried culture.

Paste varies in quality from phase to phase. It deteriorates steadily from Phase I to Phase IV, the burnishing growing less careful, firing more uneven, gritting finer. Cronenbourg paste has a curious yellow-brown color which is quite distinctive. Fine rolled quartzite is preferred for gritting in the earlier pieces. Grain imprints are infrequent. See Appendix II. Mica flakes appear frequently in the paste of the late pots of the South Baden complex.[2]

The period of time occupied by the various forms, together with the groups in which they commonly occur, as well as the relative frequency of their occurrence, is summarized in figure 64. Only those types which occur in more than one group, and then only those which are common, are represented. The assignment of sites to different periods is largely based on unusual short-lived types which appear in one phase only.

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[1] Maier 1958, in an extended discussion of this group which Kimmig 1948 calls the Bischoffshingen Group, attempts to associate with it an unornamented pottery whose type station is at Riegel on the basis of a high mica content in the paste of the two groups. Because the Riegel ware is similar to Tumulus Bronze pottery, he therefore concludes that the Bischoffshingen group is also as late as that and an inseparable part of the Riegel group. Furthermore, he asserts that the relief bosses on the Bischoffshingen pots which are also common on certain late Bell beaker types serve to strengthen the connection. (but see note 2 below).

[2] Whether these mica flakes were deliberately chosen as a gritting as implied by Maier and Schmidt 1958 or whether their presence is purely due to accident through use of clays deriving from igneous rock which outcrops as one moves southwards, seems to be a problem which cannot be solved with certainty on the basis of the evidence at hand. It is therefore clearly dangerous to use the presence of mica flakes as either a chronological or cultural horizon as Maier seems to do.

On the basis of analogies with early Bronze age pottery and with SOM materials, Phase IV is clearly the youngest while Phase I is clearly the oldest because of its relationships with the Chassey culture. Then Phase II must be slightly younger and Phase III younger still. By comparison with the other groups and their form assemblages, it is possible to place the second phase in the Rhineland, Urmitz and unfortified Mayen, on a par with Phase II in Alsace and, hence, with Phase II in the Classical group. Fortified Mayen and the Belgian group fall into Phase III, while some of the Belgian finds may be as late as Phase IV, with types comparable to Phase IV types in Alsace and S. Baden. In the Classical group, the core area is contemporary with Alsace, Phase I, and carries on slightly later, while some sites on the Main or in the Speyer area fall at the transition from Phase I to Phase II, and a few on the Neckar seem fully Phase II. Early Phase I then, from considerations previously adduced, is parallel with the Chassey A/B transition, Phase II with Chassey B (confirmed by the find[1] of Phase II flaring break profile tulip beakers from Chassey itself. Phase III is probably parallel with the end of the Chassey culture in the Belfort Gap and Rhineland Schnurkeramik. Phase IV is probably parallel with SOM-Horgen times or even later[2].

The Pfyn Culture

Before turning to the South Rhine-Bodensee group, it is necessary to deal with material found in eastern Switzerland. This has been called Michelsberg by some

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[1] P. 243, ref. 1.

[2] We find it difficult to accept the extremely low datings which Maier (1958) appears to give to finds grouped around Munzingen, and which would place them in the early Bronze age, or even in the Tumulus Bronze period. The lateness of the Munzingen group (which we assign to our Phase III) cannot be contested, but the analogies with the early Bronze age, and especially with the Tumulus Bronze material, should not be overworked.

Swiss authors[1] but the group has practically none of the types which we have been considering. In fact, it has instead a number of forms which are quite distinctive and which place it squarely in the family of north Alpine members and relatives of the TRB culture, including those of Altheim[2] and the Moravian branch of the south group[3] of TRB, as typified by Jevisovice C2 (Stary Zamek)[4], Slaný (Slanska Hora)[5] and Brno-Lišen,[6] lowest levels. The east Swiss material, however, has its own character which is most clearly represented by finds from Pfyn[7] in the Thurgau. Hence, it is proposed to call it the Pfyn culture.

The Pfyn culture is distributed over much of eastern Switzerland, though not all sites can be readily identified because of inadequate excavation. A list of some of the sites is given in the table accompanying the distribution map in the appendix, but this does not claim to be exhaustive.

Pottery of the Pfyn culture includes material from many of the more famous east Swiss lake dwellings, including those on the Zuricher See and from Robenhausen near Wetzikon[8]. Pottery, when preserved, is distinctive. Forms 8 and 9 in figure 52 are of a type characteristic of the TRB cultures[9] and the types, as we shall see, are

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[1] Vogt 1934; Vogt 1953; Baer MUFS forthcoming; but see also Von Gonzenbach 1949 who stresses the differences, perhaps even too sharply.

[2] I am indebted to Dr. Driehaus of Mainz for letting me see the proofs of his forthcoming work on the Altheim culture which is to appear in the Römisch-Germanisch Forschugnen.

[3] Jazdewski 1936.

[4] Palliardi 1914 and Brno Museum.

[5] Böhm 1941, 1946.

[6] Benešova 1956.

[7] Keller-Tarnuzzer 1944, brief note. The full excavation report is ready and I wish to thank Dr. Keller-Tarnuzzer for allowing me to read it, refer to its illustrations and especially for permitting me to draw some of the unpublished material in Pfyn museum.

[8] Much of the material from Robenhausen has been lost but, for a few surviving pieces, see Messikomer 1913, pl. 29.

[9] Good parallels are very numerous. For some, see Jazdwsski 1932, Jazdewski 1936 or, better still, pl. 87 in Stocky 1926; Stikhova 1954, fig. 169.

also shared in part with the South Rhine-Bodensee Michelsberg. They also occur frequently in various sizes and with different surface treatments in all members of the north Alpine group of cultures. It is not unusual for them to have a scraggy slip coating in the Pfyn culture.

Cups, form 2a and b, occur in great numbers and occasionally they are ornamented with fingernail impressions, simple strokes, or unbored lugs.

The handled jug is also common. Two profiles exist, 1a and b, with a bulge or with a smooth-bellied curve. Handles are nearly always of the broad strap type in contrast with the tube or oval handles in the relatively uncommon Classical Michelsberg jugs. The Pfyn culture handles terminate slightly below the rim and infrequently are incised with six channels, as shown.

Small bulging conical pots like form 4a are not uncommon, but the four-hole lugs on the particular piece illustrated are unusual. Another infrequent type is form 5, not unlike the "fruit stand" of Danubian contexts, though here the entire form is hollow. In form 4b, the conical bulging pot is ornamented with a series of rim lugs.

A second variety of Pfyn storage jar exists which has equal rim and base proportions, often with a slight bead or foot, forms 10 and 11, figure 53. These may well be the prototype for Horgen jars.

A wide selection of carinated bowls, forms 12a-d and 13a-c, exists with forms quite unlike those of Classical Michelsberg (see TRB parallels in figure 63, no. 2 and 3) or the other groups which we have discussed, excepting 12c.

The tendency to a bulging profile like that of form 13c produces a pot which is uniquely characteristic of the culture. Other forms like 12d have parallels in the South Rhine-Bodensee Michelsberg, as do the large storage jugs of forms 15a and b.

Paste in the Pfyn culture is typically black-gray and coarse-surfaced, very rarely burnished, with fine particles of mica in the clay and invisible gritting. At Pfyn itself the storage jars are made in a distinctive red-purple clay which does not appear at other sites and must be a local material. Grain imprints are rare. See Appendix II; but grain itself usually survives.

The numerous finds in bone and wood are famous, especially those from Robenhausen, and it does not seem necessary to discuss them here. Pfyn itself, well-excavated by modern methods, has yielded a great variety of finds giving a quite complete picture of the culture.

Striking among stone implements is the straight square-section battle axe in hard greenstone with square butt and grooves running from the point to the heel around the shaft hole. This type, which Vogt[1] calls a rillen axe is widely distributed throughout the whole group of north Alpine cultures, and drill cores found at Pfyn show that there, as at Altheim, it was produced on the spot. The axe does not appear in Michelsberg contexts outside the South Rhine-Bodensee group, though stray finds are known as far north as Limburg[2]. It would be a poor procedure to attach too much chronological or cultural importance to this axe which has such a wide distribution.

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[1] Vogt 1953.
[2] Mandera 1957, fig. 2, p. 7.

The internal chronology of the Pfyn culture does not concern us here. Its relative chronological position with respect to other cultures is quite well fixed. It is overlain by Schnurkeramik at a number of places[1] and, at Lutzenguetle in Liechtenstein, it lies over a stroke-ornamented ware which Vogt calls older Schussenried[2]. The types of stroke-ornamented ware in the Swiss-South-German-North Austrian region require a new, extensive study before the attribution can be made with certainty. Pfyn is almost certainly earlier than Horgen, though definitely stratified sites are not excavated. Mixed finds from some of the sites on the Zurichersee contain material from both cultures, and the same is true of Robenhausen itself. In any event, there is probably a close organic connection between Pfyn and Horgen and it may be that Horgen is a late degenerate phase of the Pfyn culture. The relative chronological position of the Pfyn culture is such that Horgen must be contemporary with early Jevisovice B at the latest and perhaps even overlaps with C1. In that case, it is too early to be contemporary with SOM in Alsace, for example, which is parallel with our Phase IV, later than Jevisovice B. This lends weight to Sandars'[3] remark that the SOM-Horgen relationship is too distant to have any usefulness for chronology. The recent effort by Arnal and Burnez takes the relationship as a settled matter of fact which is far from so.

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[1]The stratified sites are summarized by Baer 1955.

[2]Vogt 1945; but the majority of the finds are unpublished and lie in the Vaduz museum which I was unable to visit. Only material from the site in the study collection at Zurich was examined.

[3]Sandars 1957.

Baer's thesis[1] that the Pfyn culture (which he calls the southern branch of Swiss Michelsberg) is later than the South Rhine-Bodensee Michelsberg cannot be supported stratigraphically. It is probable that the life span of the two groups overlap, as evidenced by interchange of types, but this interchange does not imply evolution from the northern to the southern group.

On the basis of parallels with the Altheim and Moravian TRB material, the Pfyn culture can probably be dated with Jevisovice C2[2], or slightly earlier than the lower level at Slanska Hora[3], and we will consider it the furthest western extension of the South[4] group of TRB.

The South Rhine-Bodensee Group

The South Rhine-Bodensee group has a vast amount of surviving ceramic material, much badly excavated and often mixed with that of other cultures. Weier near Thayngen is the only site which is apparently free of mixed finds, and we may therefore take many of the types from there. A strong Pfyn culture component is present, and it is proposed that Michelsberg people moving up the Rhine from the Classical group and from the Phase I group in Alsace assimilated a certain number of indigenous Pfyn folk, probably in the Thurgau.

Because of the fusion of two traditions and given the excellent survival of ceramic material in the north Swiss area, the number of forms exceeds that of the Classical group. Some 90-odd of these types are shown in

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[1] In forthcoming MUFS.

[2] I am indebted to Miss Houštova of Brno for showing me her sketches of all of the sherds (some 1800) from the lower levels of Stary Zamek near Jevisovice which have never been published. I am also indebted to Dr. Jiri Neustupny of Prague for allowing me to peruse the unpublished full excavation report by Palliardi which is far more complete than the provisional summary in the WPZ 1914. Dr. Böhm plans to publish this manuscript sometime in the near future.

[3] Dr. Böhm was kind enough to show me some of the unpublished original material from this site. See also discussion in Stikhova 1955.

[4] Kossina 1913.

figures 54-58, and it is very possible that further excavation may reveal still more.

Close connection with the Classical group is seen in the ladles of form 15a and b, while 15c and d probably relate to the early phase in Alsace. The small conical cups of form 14a-f seem to be mostly derived from the Pfyn culture even down to the ornament on 14c, a rare piece. Form 14d repeats an ornamental motif seen on several occasions in the Classical area, notably on a ladle from Monsheim, figure 48, form 22. A small group of cups with a definite Chassey connection appears as forms 7 and 9 and is to be compared with figure 62, no. 7.

Lugged cups, not unlike those in Classical Michelsberg, with the exception of the flat bottom, forms 5a and b, 6, are very common, while the variant of forms 4 and 8 was previously compared with one from Schierstein, figure 47, form 11.

Handled beakers, rare in Michelsberg (see comments relative to form 7, figure 47) appear in several variants--one of which, form 3, has stroke ornament not unlike the pot of form 14d. Small cups with pointed bottoms, flaring rims, and thin walls, forms 1 and 2, have no exact parallels outside the Bohemian group[1].

The lugged conical bowl of form 11 and smaller example of form 10 look very like Pfyn forms, while the rims of a large storage jug, form 12, is identical with a piece from the Donnersberg near Finthen in the northern part of the Classical group[2]. Form 13 of a similar pot is ornamented

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[1] Cup from Dáblice, Stocky 1929, pl. 107, no. 6.

[2] Mainz Stadt Museum 25/343 and illustrated in Behrens 1927.

in a purely local style, coming from the same site as form 3. The dot ornament marking some pieces is not uncommon throughout the Michelsberg culture. Maier's view[1] is that this aspect of the ornament which appears on sherds from the Bodensee implies close connections with the Baden culture. Specific Baden forms, and especially the so-called "kanalierte keramik" (channeled ware) and the "ansa lunata" handle jugs have never been found, however, on the Bodensee[2]. There are also chronological difficulties in the way of this idea.

The storage jars of the South Rhine group are mostly derived from the Pfyn culture. There are a great number of small variations in form and proportions. The fact that these funnel-neck jars are derived from Pfyn has strongly influenced Vogt's theories on the origins of the Michelsberg culture but, as we have shown, the types are exclusively confined to the South Rhine group. None exist to the north with the exception of finds in mixed Schussenried-Michelsberg settlements in the upper Danube area. The connections of Schussenried coarse and unornamented ware certainly are with the TRB and Jordanów cultures, so that this is not surprising. All the South Rhine jars, with the exception of types 16 and 17 derived from the Alsace group (see figure 50, type 15), share the flaring profile of the TRB cultures, though some, forms 19c and b, are more directly derivable from Altheim (see figure 63, no. 5). Others with straight sides and flat bottoms, like form 23,

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[1] Maier 1955.

[2] For examples, see Novotny 1958, pl. 44-52; or Patay 1938, p. 12 ff.

go back to the same source (compare figure 63, no. 4) via either Pfyn or Schussenried.

Surface treatment of storage jars includes partial burnishing or, more commonly, a scraggy slip coating. Ornament includes finger impressions or, as in the case of form 24a, the typical "Romanesque" moulding of the south group of the TRB culture and the Bohemian Jordanów culture. Form 24c has similar connections. One jar, form 24f, also has rim stroke ornament which appears commonly in Rossen, but is also occasionally found in TRB contexts[1].

There are at least fifteen types of carinated, flat-bottomed bowl, forms 25 through 31, displaying the traits of all of the cultures providing elements for the South Rhine group. From Classical Michelsberg and ultimately from Chassey come forms 29d, 29e, 29f. From the Pfyn culture come forms 29a,b,h and i, and probably form 30. From the neighbouring younger Cortaillod culture[2] come form 29g and, perhaps, form 31, while form 28 is directly derived from TRB types. The source of form 25 is not clear; perhaps it is a degenerate version of form 29b, while form 26a is probably a local invention though related to Pfyn culture types. The little conical pot of form 27 is a unique piece.

The "cordon multiforé" flask of the Classical area appears--form 32a--as does the simple storage jar with pointed and a variety of flattened bases, forms 32b, 34a-c. These latter types are probably of Pfyn derivation.

A unique piece from Weier is a shouldered flask of Cortaillod and Chassey type, form 33. It even has a piece of adhering birch bark ornament in the Cortaillod

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[1]Knoll 1954.

[2]Von Gonzenbach 1949, fig. 9, no. 9.

manner. It may be compared with figure 63, no. 27 from the Chassey culture or with those illustrated by Von Gonzenbach from the Cortaillod area.

Small flasks with single opposed lugs, form 35a, and a variant with four lugs, form 35b, seem related to TRB types and are probably derived from the Pfyn culture. The same is true of forms 36 and 37.

Tulip beakers of slender, smooth-profile, Phase I forms are common, forms 38 a-e. One, form 38d, has a vestigial base lug, while 38c has vestigial rim lugs. These features would tend to place the finds in the middle of Phase I.

Baking plates, form 43, are quite common, and average almost exactly 23 cm. in diameter. They fit the majority of the more slender storage jars with non-flaring rims quite exactly. Edge treatment is commonly a row of finger impressions. Turned up edges do not exist, while mat imprints on one side are not uncommon.

Cylindrical pots with bulging sides derived from Pfyn types exist as forms 39a and b, while variants with "Romanesque Moulding" are forms 39c and d. An unusual piece with this type of rim is 39e. It looks like a cross between the sack-shaped version of the tulip beaker of form 38b and the TRB ornamented pots of form 39. A further variant, form 39f, has an over-all stroke pattern.

Odd types like forms 40 and 41 have no obvious parallels, though 41 is vaguely reminiscent of some rarer types in the Classical group (see figure 46, form 5d).

The handled jug, form 42a-g, is very common in the South Rhine group, in contrast with other Michelsberg groups. Handles range from simple tubes and ovals to complicated six-channel incised or plain strap types taken over from Pfyn. Shapes fall into four general classes: a simple round profile, form 42a; a swollen bottom variant, form 42d; a straight-sided, sharply-profiled high type, form 42e; and a bulging belly type, form 42f. With the four common types of handles appearing on all of these shapes, there are 16 possible variants, not including unusual forms like 42g which has a peculiar "bird's foot" ornament on the handle closely related to north TRB types[1]. The same ribbed handle without the splay foot ornament is one of the four common types, appearing on form 42d.

Simple ornament is not uncommon on these jugs with two slight breast-like protrusions, like those on form 42c, the most common. Occasionally these protrusions are multiplied and appear all around the neck of the pot, as in form 42b.

Paste of the South Rhine pots is rather variable. Black, mica-charged clay similar to that of the Pfyn culture is common enough but, in the forms derived directly from the Classical and Alsace groups, lighter colors and high burnishing appear. Storage jars follow Pfyn techniques. Gritting is rarely visible except in fracture. Grain imprints are common. See Appendix II.

Stone and bone and wood types[2] from the South Rhine group are very numerous, including most of the forms

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[1] Lindenschmit 1900, pl. 13, no. 203.

[2] Sulzberger 1924 and many unpublished pieces in the Schaffhausen museum.

which appear in the Classical group plus many more, because of the excellent state of preservation of the lake site materials. The "rillen" axe is taken over from the Pfyn group as are some curious varieties of antler scraper. Large flint sickles are not uncommon.

Bone pendants of simple form, some with dot ornament, are common, as are worked points, needles, and a curious two-pronged "fork". Conical loom weights predominate as opposed to round disks weights in the Pfyn culture. Pointed butt greenstone axes are frequent and are hafted by means of antler sleeves in club-like handles. Antler harpoons are occasionally encountered. Cloth is well preserved in some sites.

With the exception of Weier, the exact form of the settlement of the group is little known largely because the early excavations of the middle of the 19th century destroyed a large part of the evidence. Reference to the recent report on the new Weier excavations[1] discloses that the house types do not differ drastically from those in other moor sites of the culture, like Ehrenstein, or from the forms common around the Federsee in other cultures (Schussenried, etc.).

The South Rhine group has a very small distribution area centered on the east-west flowing limb of the Rhine and around the outlet of the Bodensee. A slight penetration up the valley of the Thur into Pfyn territory and an equivalent penetration up the Aar valley in the direction of the younger Cortaillod culture is attested for a very few sites.

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[1] Guyan 1955.

Chronologically, there may be more than one phase present in the South Rhine material, certain pot forms having counterparts in Phase II settlements in other areas, but these are far too few and too rare to presume that the group lasted much beyond the end of Phase I in the known sites. The only certain stratigraphy occurs at Eschenz-Insel Werd where a layer containing sherds definitely belonging to the group lies under a sterile layer capped with Schnurkeramik[1]. Bodman, according to the old excavation report of Schumacher[2], has similar stratigraphy. Sipplingen, which certainly delivers the group's material, is also reported to produce Horgen finds in stratified sequence[3] but this report cannot be trusted. Wilchingen, recently cited[4] as having sherds of the Michelsberg culture lying between Rossen and Schnurkeramik horizons, is untrustworthy since the material was merely sorted out by type after removal from the dump of a mechanical excavator[5]. Forms of the pottery which reflect TRB types may have been acquired not only from the Pfyn culture contact but also from Schussenried peoples assimilated, as we will attempt to show, at about the same time in mid-Phase I.

If the stratigraphic position of the Pfyn culture, based on Lutzenguetle, is correct, then the South Rhine group which is incursive upon it must be somewhat later in its establishment than the stroke ornament ware found at the

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[1]This largely unpublished excavation has yielded important material now in the Frauenfeld museum. Again, I must thank Dr. Keller-Tarnuzzer for permission to study and draw some of the finds.

[2]Schumacher 1899a.

[3]Reinerth 1932.

[4]Guyan 1949/50; Baer 1956 (summary of MUFS forthcoming).

[5]Confirmed in the reserves at Schaffhausen where boxes of finds labelled "sorted" and "unsorted" were piled high, with no precise indications of a stratigraphic excavation.

Liechtenstein site. The presence of pure younger Cortaillod types at Weier proves contemporaneity, and the survival of vestigial, lugged tulip beakers indicates, along with some of the carinated bowls, a position slightly later than the earliest phase of the Classical group, hence slightly later than the Chassey A/B transition. Since early younger Cortaillod and the Chassey A/B transition are contemporary, the two datings agree. Contemporaneity with the Pfyn culture implies a chronological position roughly that ascribed to that group in the central European succession, i.e., Jevisovice C2.

The Bohemian Group

A small group of Classical Michelsberg folk from the Main valley probably penetrated up that stream to its headwaters, portaged over to the nearby Ohře and so down to the Elbe and, via its tributary the Vltava, to Prague[1]. One far-flung find from Uřetice near Chrudim shows that the penetration may have gone even further. Judging from the forms of the pots, these events took place at about the end of Phase I or in early Phase II. Types are few and mostly stray finds. The tulip beaker in the slender Classical form, types 1 and 2 of figure 58, is common. A very few flat-bottom carinated bowls of form 6 are known, while handled jugs of two types have been found with tulip beakers. Form 7 is definitely a Phase II Baalberg type[2] which shows that the end of Classical Michelsberg Phase I and Baalberg II are roughly contemporary. Further evidence for this is the find of form 5 with a tulip beaker[3].

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[1] Suggestion first made by Stocky 1926, p. 137 (1929 ed.) and repeated (without due credit) by Buttler 1938.

[2] Figure 63, no. 7.

[3] Compare with Stocky 1929, pl. 84, fig. 3 from Slanská Hora, also noted by Axamit PA 28, 1916, p. 71.

Some small beakers with widely flaring rims and round bottoms, forms 3 and 4, have been attributed[1] to Michelsberg but this may be uncertain in view of the find of one, now in Brno[2] and hitherto unpublished, which is said to have been found with sherds of early Unětice type. A jug with small lugs around the rim from Hospozin[3], taken in a recent study[4] as characteristic of Michelsberg, was in fact found with a small handled cup having closest parallels in early Unětice types.

Paste of the Bohemian pieces is variable, local materials playing a strong role, However, burnishing is well executed, and gritting is completely suppressed. Technique is identical with that of the Classical group.

In the absence of excavated sites, nothing is known about the settlement forms and house types of the group. Further, lack of joint finds makes it impossible to attribute any particular tools to it. Unfortunately no Michelsberg material has been found in the last thirty years, and it is to be hoped that some will one day turn up under circumstances which make excavation possible, perhaps in the Komořany area. Otherwise the group will always remain rather anomalous in the Bohemian scene.

Reports of burials from Libiš, Prague-Bubeneč, Prague-Troja and Uřetice[5] must be treated with reserve in the absence of scientific excavation. Attribution of lake

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[1] By Stocky and Schranil, the former noting (p. 137) that the relationship between Michelsberg and early Unětice is noticeable.

[2] From Jiřikovice, Pa 13241/40. The illustratedpot is published here for the first time.

[3] Stocky 1929, pl. 107, nos. 9 & 10 or Schranil 1928, pl. 15, nos. 4 & 9.

[4] Arnal & Burnez who unfortunately use the pot to relate the Breton Chassey to Michelsberg, a relationship utterly without foundation, inasmuch as the comparison piece is completely atypical.

[5] Schranil 1928, p. 80.

or moor dwellings in various places noted by Schranil and Stocky must also be considered with caution in the absence of ceramic evidence. These sites are not included in the distribution map in the appendix, nor do they appear in the table accompanying it, though they are plotted on the maps of Stocky[1] and Buttler.

The chronological position of the Bohemian group is reasonably certain, and its connections are with the second stage of the Baalberg culture. The similarity of the carinated flat-bottomed bowl of form 6 with some Jordanów types led Stocky[2] to date the group in the middle of Jordanów times. That is not unacceptable to our chronological scheme. The flat bowl with ledge handles from Křic, form 5, has one analogy from Bodman in the South Rhine group, figure 56, form 28, and other analogies in layer C 2 at Jevisovice[3]. That agrees with our assumption that the Bohemian incursion took place at the end of Michelsberg Phase I, at a time roughly parallel or slightly later than the formation of the South Rhine-Bodensee group. Assimilation of local Baalberg folk, or more probably, assimilation of the Michelsberg newcomers by the indigenous Baalberg and Jordanów population, produced a mixture of forms not unlike those of the South Rhine group where TRB and Michelsberg elements are also present in nearly equal proportions.

Questionable Outliers of Michelsberg Material

Michelsberg material has been reported from

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[1] Stocky 1929, figure 80, p. 199.

[2] Stocky 1929, p. 136.

[3] Brno Museum. Unpublished.

various sites in central and northern Germany[1]. It is not possible to accept the majority of these for the evidence is too thin. There has been a tendency to attribute almost any find of unornamented pottery with finger impressions or flaring rims to Michelsberg.

Material from Merseburg[2], Seiselitz[3], Halle-Kollwitz[4] and especially a find from Halle-Dölauer Heide[5], while not totally convincing, may be due to the infiltration in the upper Saale area of a few individuals using Michelsberg pottery. The finds are restricted to a few small, late (flaring, often extremely so) tulip beakers, with the exception of the find of a rim of a typical Classical baking plate with spiral mat imprint in the Salzmunde settlement found under a chambered tomb (barrow 6) on the Halle-Heide. This find now in the Halle museum, together with a tulip beaker from Merseburg in the same collection, are the most characteristic which the author has seen. Finds from the Stoszen area at Jena[6] are probably related to the Jordanów culture or one of its variants.

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[1] Auerbach 1932; Richter 1922, Schliz 1913; Berlekamp 1954; Kaufmann 1955. The Beusterberg, Tackenberg 1951, has very little claim indeed. The ceramic evidence could as well be TRB; the settlement form too is not uncommon in the TRB group according to Grimm 1958; and the whole bears little relationship with Michelsberg sites, despite Tackenberg's long and erudite argument.

[2] Merseburg Museum I/668 (temporarily at Halle).

[3] In the Jena University collection.

[4] Halle 11713.

[5] I am indebted to Dr. H. Behrens for showing me this new, unpublished find. (Behrens 1958).

[6] Published in Berlekamp 1954 and in a work inaccessible to me, G. Eichorn, Vorgeschichte der Grafschaft Camburg, date ?.

The Halle-Dölauer Heide fragment was found in 1956 with fragments of a bowl similar in form to those accompanying the two tulip beakers from the Hutberg (pit 151)[1]. These carinated bowls are also augmented as a group by the piece from Halle-Kollwitz--a stray find--also at Halle. Hence the case for the attribution of the Hutberg finds to Michelsberg, (though not, of course, the entire settlement as Grimm[2] has shown) is strengthened. The finds from Dolzig[3], through geographical proximity to this entire complex, may bear out Auerbach's attribution (alone among those pieces published by him).

Michelsberg sherds have also been reported from a number of French sites. In most instances, the material is probably late Chassey and not Michelsberg at all. Some pieces[4] have not been available to the writer and no conclusion can be formed about them. The same applies to finds made near Lumbres in the Pas-de-Calais by R. Prévost (Wisques). The report of a Michelsberg settlement from Schötz near Luzern, though not impossible, is reported by such an untrustworthy source[5] that it is not possible to credit it. The piece from Jiřikovice near Brno previously mentioned in connection with the Bohemian group is also not considered for plotting on the distribution map, though its claims are stronger than much of the foregoing.

The find has been reported[6] of a tulip beaker, two handled amphora and a TRB collared flask in the same pit

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[1] Halle 38,255c, 38,740h, 38,796L; and Benesch 1941.
[2] Grimm 1958, p. 12.
[3] Auerbach 1932, pl. opp. p. 88, nos. 1 and 2.
[4] Notably those from Epernay reported by Arnal and Burnez 1957.
[5] Reinerth 1926 repeated in Buttler 1938.
[6] Fock 1941.

near Ratibor (Raczibor). Becker[1] used this find as a link in the comparative chronology of the Michelsberg and TRB cultures. However, examination of the material shows that the "tulip beaker" corresponds to none of the common types in any of the regional groups, least of all those from the nearby Bohemian group. The nearest comparison, though very weak, is with one from Urmitz[2]. Moreover, the Ratibor piece has been so extensively restored around the rim that even this comparison is misleading. According to E. Neustupny, the Ratibor piece has exact parallels in the South group of TRB in Poland[3]. There are no chronological objections to the comparison, however, for the beaker in question is not utterly unlike those forms which we have encountered in Phase III.

The Schussenried Culture

Though one of the earliest Neolithic cultures identified in southern Germany[4], our knowledge of this group has remained relatively weak. Since the destruction of the Stuttgart Museum, the task of piecing together the information becomes even more difficult. Happily, with the post-war excavation at Ehrenstein[5] coupled with a fairly copious literature, something can be rescued from the shambles. Early theories[6] stressed that the culture resulted from an amalgamation of Michelsberg and Rössen peoples, but this cannot be substantiated. Equally, the idea that

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[1] Becker 1947, p. 263f.

[2] Bonn 13,329, illustrated in Buttler 1938, pl. 19, no. 3.

[3] Private communication.

[4] Frank 1876.

[5] Paret 1955, unpublished material in the Ulm Museum, and Zürn 1958.

[6] Götze 1900 and Reinecke 1900c.

Schussenried ornament is derived from Chassey[1] will not stand close examination, and the differences in pot forms rule out the argument completely.

Ehrenstein confirms that at one time Schussenried and Michelsberg occurred together, though there are many other sites which are free of Michelsberg influence. Unfortunately, a lot of the unornamented wall sherds were thrown away by Paret, making it impossible to restore many of the undecorated forms, but it is still possible to reconstruct some of them. Michelsberg forms from Ehrenstein, figure 59 top, 1-3, are typical of Phase I, including tulip beakers of early lugged type, flat bottom, carinated bowls, baking plates (not shown), storage jugs, etc.

The unornamented forms which cannot be connected with Michelsberg, shown in the lower half of 59, taken from Ehrenstein and other sites, are quite distinctive. Form 8 is an unusual handled bowl vaguely like figure 54, form 2, which derived from TRB types. Form 9, a conical bowl with vertical rim and impressed ornament is also characteristic. Form 10 is a larger conical bowl, flat-bottomed, with involuted rim. Form 11, a footed bowl with bulging sides and flaring mouth is strongly reminiscent of Rössen shapes. Form 12 repeats this profile on a much larger scale in a storage jar with scraggy slip coating. Type 13 has a rim with "Romanesque" moulding and two unperforated shoulder lugs. Form 14 is a large bulging storage jar with narrow flat bottom and two opposed handles. Form 15 is a taller version of this shape, without handles, but with a string-like garland around the neck. Form 16 repeats the shape with two handles and a much longer straight neck. Form 17 is a

[1] Childe 1929, 1957.

"fruit stand" of classical Danubian type, and form 18 is a small, conical, flat-bottomed pot with stroke rim ornament of Danubian type. Form 19 is a very fine funnel beaker, and form 20 is a flat-bottom, conical bowl with involuted rim and lugs at the break in the profile. The affinities of these forms are discussed below.

Schussenried ornament exists in a rather more limited variety than usually thought. Incision before firing is common in contrast with Chassey technique. The most striking motif, shown on a number of pots in figure 60, is a series of interlocking cross-hatched triangles creating a reserved zig-zag design. This is usually encased in a more or less complicated rectangular frame. The ornament is most frequently applied to handled jugs, but it also appears on other jars including forms 4, 6, 7 and 8. The decoration of the pot of form 1 is unique, and has no exact counterpart to the writer's knowledge. That of forms 2 and 3 is quite standard. Form 4 uses a shoulder on the jug as a part of the ornamental motif. Form 5 shows the simplest form of ornament, a simple cross-hatching in parallel bands around the neck, above and below the belly. The ornament of form 6 is somewhat more unusual; a dot motif introduced within the triangles. That of form 7 is conventional, though the parallel rows of strokes near the rim have few counterparts. Form 8 has a simple reserved zig-zag on a pot of form 6. Form 9 shows a combination of the ornament on form 5 and a reduced version of that on form 1, while form 10 simply has a series of open cross-hatched rectangles across the belly and simple neck strokes. Form 11 shows how complex the detailed working out of the reserved

triangle system on some of the more elaborate pots can be. Form 12 from Schussenried is included because the type is unusual in these contexts, though it is common in the so-called Aichbühl culture[1], while form 13 is similar to the unornamented types of figure 59, nos. 10 and 20, with the addition of simple vertical and horizontal stroke ornament at the rim and near the unperforated lugs.

Outlying examples of Schussenried pieces are rare[2]. Most of the sites are concentrated in a narrow region in the Neckar valley and along the headwaters of the Danube. The pot from Bischoffshingen, figure 51, form 23b, is the only piece lying very far from this area, and it is as much connected by form with Chassey as it is with Schussenried by ornament.

It is believed that the Schussenried culture is not a member of the western group or family. If we examine the material—both ornamented and unornamented—from the Bohemian branch[3] of the Jordanów culture, figure 9, nos. 1-9d, and compare it with the Schussenried forms and ornament, it becomes clearly evident that Schussenried is a far western outlier of this culture which absorbed some remnants of the Aichbühl group in passing. It is true that some of the unornamented forms of Bohemian Jordanów are shared with the south group of TRB[4], but a sufficient number are characteristic of the former alone and also of Schussenried, to say nothing of identical ornament.

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[1] And curiously enough, with Fontbouisse, see Piggott 1954a, fig. 8, no. 8 and 9; Buttler 1938, pl. 9, attributes the pot to Aichbühl though the original at Stuttgart is clearly marked Steinhauser Ried (Schussenried).

[2] Coblenz 1951, on the basis of the work of Buschendorf 1951, has shown that the pieces in the Sudetengau noted by Ratt 1939/40, Preidel 1934 etc. belong to the Jordanów culture.

[3] Novotny 1950, noting the differences between it and the Silesian Jordanów of Seger 1919.

[4] Novotny 1950.

The importance of the connection between Schussenried and Bohemian Jordanów cannot be underestimated, for it gives a method for dating, in terms of the central European chronology, the beginning of Phase I Michelsberg. It is clear from the Ehrenstein settlement that Schussenried and early classical Michelsberg are contemporary. Moreover, judging from the uniformity of all the Schussenried sites, the group represents but a short-lived incursion of Bohemian Jordanów into the upper Danube and Neckar. But this early stage of Bohemian Jordanów has been shown by Novotny[1] to be in direct relationship with the Phase II/III transition in the Moravian painted ware culture which is very well fixed in the central European sequence[2]. Hence the early stage of classical Michelsberg must be contemporary with this transition or a little bit later. But the correlations between Michelsberg Phase I and the Chassey culture are already known, linking up firmly the western and Danubian chronologies. The whole affair can be cross-checked with reference to the South Rhine Michelsberg group which has been dated by its relationship via Pfyn to a time contemporary with Jevisovice C2. Happily Jevisovice C2 has been shown to be contemporary with Moravian painted III, thus cross-checking the date for early Phase I Michelsberg[3]. The end of Phase I Michelsberg has been deduced from the finds in the Bohemian group as contemporary with the beginning of Baalberg Phase II, and this corresponds with Jevisovice C2 as well. Moreover,

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[1] Novotny 1950.

[2] Milojčić 1949, p. 95f. (parallel with late Vinča C)

[3] Which is probably contemporary with the Křepice phase of Bohemian TRB proposed by E. Neustupny 1956.

it is known that the South Rhine group is contemporary with the younger Cortaillod culture and, hence, that culture can also be given a date parallel with Jevisovice C2. This matches the assessment of later Chassey B and the date of Michelsberg Phase II. The result obtained is summarized in the table of figure 65.

It is interesting to compare these results with the chronologies of Grimm[1], Milojčič[2] and Mildenberger[3]. Grimm, though not dealing directly with Michelsberg and concerned primarily with central German cultures, places the beginning of the Baalberg culture at a time contemporary with the transition from older to younger linear Bandkeramik. This is wholely unacceptable in the light of recent research. However, his proposal of the contemporaneity of Baalberg I and the first stage of central German Jordanow does seem reasonable. Baalberg I is also placed in a position contemporary with older Rössen[4]. This is also unacceptable, for it is known that Michelsberg I is certainly later than Rössen but is contemporary with Baalberg I. Other faults in Grimm's chronology have been adequately dealt with by Mildenberger.

The chronology of Milojčič, dealing with the whole of east central Europe, is on its soundest footing toward the south, and after 2600 in absolute dates[5]. There is some tendency to inflate the chronological age of the northernmost

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[1] Grimm 1940, figs. 1 and 5.

[2] Milojčič 1949, end table.

[3] Mildenberger 1953, table 4, p. 92.

[4] The term "older" Rössen is used advisedly for the separation of older and younger Rössen has never been adequately demonstrated.

[5] D. Garasanin, in oral communication, tells me that the stratification at Vršnik near Tarinci (Stip) guarantees the four-fold division of the Starcevo culture proposed on purely typological grounds by Milojčič. Vinca A is definitely parallel with Vršnik IV or Starcevo IV; hence Vinca C must be quite a bit later indeed. This tends to confirm a shorter chronology than the radiocarbon dates for the early Neolithic in northern Europe give.

cultures and to compress the chronology of those cultures lying midway between north and south. Michelsberg beginnings are indicated with a question mark which now can be removed on the basis of the present study and be replaced with a firm line drawn parallel to the beginning of the Jordanów culture. Milojčič follows Grimm for the position of Baalberg relative to the Stichbandkeramik-Rössen-Walternienberg-Bernberg sequence, modifying the position of the latter two somewhat to deflate the relatively high age given them by Grimm. Shown in his chart with a sloping dotted line indicating an unsure transition, Baalberg I is placed at the Stichbandkeramik-Rössen changeover. This, too, seems too high. Michelsberg I cannot be this early.

In Milojčič's table, the end of the Michelsberg culture is shown contemporary with Baalberg II. This is clearly not uniformly so for the Belgian and Alsace-S. Baden groups have much longer lives than this, carrying on almost to the beginning of EBA 1. As far as the Classical and South Rhine-Bodensee groups of Michelsberg are concerned, Milojčič is correct, for Michelsberg does terminate with the early stage of Schnurkeramik, and direct correspondences have been shown which demonstrate that the Bohemian group disappears in Baalberg II time. If Mildenberger is correct in placing the Dolmen/Passage Grave transition in Denmark in the middle of Baalberg I, then this too agrees with the result[1].

Mildenberger, too, indicates the limits of Michelsberg with question marks, though placing the upper limit roughly parallel with Baalberg I and with a less sure limit for the beginning of Jordanów. This is made contemporaneous with the end of Rössen. Paralleling the beginning

[1]Becker 1954b is followed in figure 65.

of Michelsberg with the very early Neolithic period in Denmark is not acceptable, however.

In absolute dates, Grimm, Milojčič and Mildenberger all effectively[1] place the beginnings of Michelsberg around 2200. It is not proposed to enter into the controversy of absolute chronology here, but it is worth noting the serious divergences which exist between this date and results obtained through C14 methods[2]. There is only one direct date for a Michelsberg settlement available, a Groningen determination for material from Weier-Thayngen of 2780±130 B.C. We know on archaeological grounds that Michelsberg must be later than the Older Cortaillod culture and hence this date seems to clash with that of Egolzwill 3, a Copenhagen date of 2735±90 B.C.[3].

The dates for the Schussenried-Michelsberg settlement at Ehrenstein, 3244±200 and 3184±130, are even more unacceptable. We know that Michelsberg I must be contemporary with TRB/C time at the earliest and yet the Heidelberg dates for an early TRB settlement, TRB A/B, are 3185±115 and 3075±115. The divergence is very great between the Weier and Ehrenstein dates and between both of them and the date for Mul I, a Copenhagen determination of a site with TRB A beakers of 2620±80 B. C. The London date for Weier, as Tauber points out, contains a serious methodological error.

On geological grounds, it is known that early passage graves, taking the position of the Troldeberg find as a guide, must be much later than the last Littorina

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[1] Using Baalberg I as equal to Michelsberg I for Grimm's table where no Michelsberg is considered.

[2] Summary in Gross 1957; dates from Godwin 1957, Troels-Smith 1953 (for last Littorina-Passage Grave), 1956, Levi-Tauber 1955, Tauber 1956, Munnich 1957, Groschopf 1957.

[3] A new and, at the time of writing this unpublished, Copenhagen date of 2500±200 seems much more reasonable. (Oral communication from H. Tauber).

transgression. This transgression has been subject to numerous C14 determinations with a much higher degree of precision than is usual with archaeological material and an average date of about 3015 B.C. is given by a whole series of sources. This would tend to support the Weier, Egolzwil III and Mul I dates if two times the standard deviation is used as a confidence limit as is general practice in statistics. If the confidence limits are plotted for each of the dates quoted[1], rather than the median dates, then they appear to be somewhat more compatible with exceptions of the two Heidelberg dates (see figure 65), though the clash with the absolute chronology obtained from middle Eastern dating remains as great as ever.

The Internal History of the Michelsberg Culture

Summing up the situation for all regional groups, the Michelsberg culture cannot be shown to originate in any of these areas on the present evidence. A strong Rössen substratum appears in the Rhineland; the South Rhine group has very many TRB affiliations derived from the Pfyn culture; the Bohemian group has Baalberg affiliations; while the Belgian group has a noticeable "Western" character, much like late Chassey or SOM. The mixed Schussenried-Michelsberg settlement in Württemburg also has this character directly. All tends to point to an expansion of the Classical group in several directions. The movement in early Phase I seems to have taken a course south and east along

[1] The confidence limit is taken as twice the standard deviation of the mean count, the figures quoted with the sign " ± " in the literature. Thus, for Weier, where the date is given as 2780 ±130 B.C., the confidence limits lie at 2780 plus or minus 260 years, or 3040 and 2520 B.C. respectively. In statistical theory, the probability is only 1 in 22 that a value will fall outside the limits set by twice the standard deviation. Within the limit of one standard deviation, this probability is 1 in 3 and, for three times the standard deviation, 1 in 376. The twice standard deviation value is the one generally used, and this is referred to as the five percent confidence level.

(cont'd. next page)

the Rhine and the Neckar. Then, after a period of evolution, groups moved up the Main reaching Bohemia by the end of Phase I. At the same time, the first colonisation of the Kassel area took place in the Altenberg phase. Then, in early Phase II, the first Rhineland groups appear, evolving there until Phase III when, from that region, a group moves off into Belgium in the middle of Phase III. The Belgian group lives on until Phase IV or SOM times, along with comparable remnants in Alsace and South Baden unaffected by the Schnurkeramik conquest of part of the Rhineland, the Classical group and probably the South Rhine group in Phase II[1]. Hence Phase III in Belgium and in South Baden is later than Rhineland and southwest German Schnurkeramik. Sangmeister has actually shown from a consideration of the closed grave finds that the Schnurkeramik invasion of the Rhineland was somewhat later than that of the North Baden-S. Hessen-Wurttemburg (our Classical) region, and this is confirmed by the survival of Rhineland groups into the fortified Mayen period (Phase III). The fate of the South Rhine group is not as certain because of the possibility of a Horgen conquest before the Schnurkeramik incursion. The latter, however, is certain from the Eschebz-Insel Werd and Bodman stratifications. The Bohemian incursion of Michelsberg was quickly swallowed up in the Baalberg II population of northern Bohemia and had little lasting effect.

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footnote 1 cont'd from preceding page.
From figure 65, the overlapping of these confidence limits, the statistical limits of measurement, it is possible to pick values, shown by arrows, which accord with the relative archaeological chronology for all dates with the exception of Mul I and Egolzwil III. The causes for the probable error in the dates, and the limitations of the method, are naturally beyond the scope of this paper.

[1]Sangmeister 1951, p. 74.

The Origin of the Michelsberg Culture

Concerning the origin of the earliest Michelsberg culture, early Phase I in Alsace and the Classical area, agreement is not possible with Vogt and his followers[1]. That theory, which sees the Michelsberg culture as a far province of the TRB culture, is supported only in the case of the material from the South Rhine group. The types of the other groups have little or nothing in common with even the famous B phase of the TRB culture (a phase which, on the basis of the chronology adduced above, is far too early to enter into the discussion). The comparison made by Vogt in 1953 between the distribution areas of Michelsberg as plotted by Buttler and that of the TRB-B phase of Becker, is misleading. Vogt did not include the points which mark the actual distribution of B types, but showed only the line which Becker[2] defines in the caption of his map as the area of maximum expansion of the TRB culture. We reproduce together these figures by Vogt and Becker for comparison, figure 66.

Buttler's map plots the maximum expansion of Michelsberg and, as we have shown, with the exception of a few sites in the Kassel area, the northern material is all Phase II or even later. The northernmost points in Belgium and Westphalia, with the exception of the Altenberg near Niedenstein, in fact belong to Phase III which we have shown to be very late indeed. Though the Michelsberg and TRB cultures came into contact, this contact was, with the exception of the South Rhine-Pfyn areas, late.

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[1] See footnote 1, p. 222 . Prof. Piggott has since modified his views.

[2] Becker 1947, fig. 47.

Vogt attempts to ascribe the "knaufhammer", or polygonal battle axe to "Michelsberg" contexts in southeast Switzerland. Actually, not one of these axes has ever been found in the sites of the Pfyn culture there. However, even if they were, the "knaufhammer" is a poor choice for chronological comparisons, since it was in use for over a millenium in the Middle East. Vogt's use of the type to parallel the "Michelsberg" (Pfyn) of Switzerland with "Dolmen" times in Denmark is thus unconvincing, though the contemporaneity of the end of Dolmen time (TRB D-E) and the beginning of the Pfyn culture is not unlikely on the more solid grounds of ceramic connections via south TRB.

In any case Vogt ignores the serious differences which exist between all features of the TRB cultures and the Michelsberg groups outside the South Rhine, differences which exist in flint and stone types, bone types, camps and settlement forms, to say nothing of the widely divergent ceramics. The types from Store Valby upon which Becker[1] has leaned so heavily, vaguely related to Michelsberg, are less numerous than those which have no parallels whatever in the latter culture.

Driehaus has suggested an alternate theory[2] which would see the Michelsberg culture as an extension of the north Alpine group of the TRB culture. The idea is not unattractive. But how could one account for the strong Chassey component of the groups to the north, since there was no prior occupation of these regions to be assimilated in a northward move? Cortaillod influence on the South

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[1] Becker 1954a.

[2] In conversation, and to appear in his forthcoming study of the Altheim culture.

Rhine group is too slight. Moreover, we know that the South Rhine group is roughly contemporary with the Pfyn culture and that this culture in turn is later than the stroke-ornamented pottery of Lutzenguetle, possibly contemporary with Schussenried. But we also know that earliest Classical Michelsberg, Phase I, is actually contemporary with Schussenried; hence it must be earlier than the South Rhine-Bodensee group[1]. If we admit that Schussenried peoples were assimilated by the Michelsberg incursion into the Neckar area, then Schussenried types should not appear in any number in the area of early Phase I. This, in fact, is the case, for Schussenried forms are absent in Alsace and the western part of the Classical group. However, Schussenried material is occasionally encountered in the South Rhine group--both forms and ornaments--proving that this group was formed after the conquest of the Schussenried culture.

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1 At the Prehistoric Congress 1958, Vogt called the stroke-ornamented pottery from Lutzenguetle "older Schussenried", though he did not state his reasons for the adjective. At the same session, Guyan claimed that what has here been called Pfyn material was found stratified over Michelsberg finds in the classical sense at Weier. The two assertions, while not contradictory, must be treated with reserve. If Lutzenguetle stroke ware is older than Pfyn and Michelsberg is older than Pfyn, that implies that Michelsberg and Lutzenguetle stroke are contemporary or that one is older than the other. But, since Michelsberg is contemporary with Schussenried as defined above, it must be younger than an "older Schussenried". Then the sequence would be older Schussenried, younger Schussenried and Michelsberg and, finally, Pfyn. This would affect the conclusions concerning the relative dates of the South Rhine and Classical groups for under such a scheme they would have to be contemporary, or the South Rhine group could be earlier. Such a conclusion would lend weight to Driehaus' theory. However, if the material in the Zurich reserves from Lutzenguetle is examined, it seems to be premature to discern an "older" Schussenried there and, as for Weier, one must await the publication of clearly stratified remains with well-identified pottery in definite positions.

The closest comparisons which we have found for the stock of Classical Michelsberg in Phase I in ceramic forms, to say nothing of stone, flint, bone and perhaps settlement forms, lie in Burgundy at the time of the Chassey A/B transition. We find prototypes for lugged tulip beakers, lugged storage jars, carinated bowls--some with flat bottoms, hemispherical bowls, bomb pots including relief pastilles, spoons and baking plates. A plausible explanation for the origin of the Michelsberg culture may be that a segment of the Burgundy Chassey folk move off via Alsace into the Classical area, assimilating non-western groups in their path as we have shown. New types, like the handled jug, the necked flask, the flat-bottomed, footed bowl, are acquired from these peoples, and other new forms are evolved. The non-western groups are not pushed back; they disappear, and the early Classical Michelsberg culture appears instead. One must not only account for the origin of the Michelsberg culture; one must also account for the disappearance of those cultures formerly occupying Michelsberg areas.

Possible Cause of Expansion of the Michelsberg Culture

In a recent paper[1], Troels-Smith shows that the introduction of the older Cortaillod culture in Switzerland is paralleled by a decline in the Beech pollen curve and a rise in cereal grains, implying deforestation and dependence on agriculture. These cereal pollens also appear prior to the occupied level at Egolzwil 3, showing that this group had not the oldest agriculture in Switzerland. It is also proposed that, in a later phase, the rise of the elm curve implies its deliberate encouragement for

[1] Troels-Smith 1956.

fodder and this, connected with the frequent appearance of cattle bones in sites of the younger Cortaillod culture, implies an increasing dependence on cattle in the mixed farming of the time. It is well known that the widespread introduction of cattle-raising in a formerly sedentary agricultural economy usually leads to a thinning of population density and to a search for new pastures. These events take place in the west Alpine area at precisely the time of origin of the Michelsberg culture. If the data can be extended to the upper Saône region, then this may account for the initial breaking off of a group from the Chassey people in the area and the aggressive move into the Rhine valley. Further expansion from the Classical area continues the same pattern at the expense of the predominantly late Danubian farming folk occupying the region. Finds of cattle bones from Michelsberg sites in the Classical area are very frequent. This hypothesis can only be confirmed through suitable excavations in Burgundy and upper Alsace.

Theoretical Aspects of the Origin Problem

During the last few years, there has been a considerable revival of interest in the origins of the later phases of the Neolithic period, an activity which resumes a controversy current prior to the first World War.

If, as most will generally acknowledge, what we see in the archaeological record is only a very coarse sample of the complex material culture which existed at one time, then it is evident that the early stages of development of this culture, produced presumably by still fewer individuals than at the period of maximum growth, are even more coarsely represented in the record or, more

probably, not at all. Hence, a problem arises in the case of nearly all groups in the Neolithic period where the evidence at hand does not provide too much solid evidence for the early phases.

The development of a material culture and the volume of its remains can be taken as an index of population growth, all other factors being equal. Early phases will rarely survive since they are produced by the relatively few people who used transitional forms of objects carried over from the sources of the given culture. The same phenomenon is much less true for the end phases of the culture for presumably more people are present producing things when they are assimilated, annihilated or pushed back by other groups. Hence the archaeological record is correspondingly more complete. If the origin of the culture takes place because a small group splits off from a parent body and colonises a new area, a phenomenon quite common in this stage of development of society, then the numbers of people and volume of remains must necessarily be small.

The problem of origin becomes more acute when the parent of the culture in question produces objects which by their very nature do not lend themselves to a subtle complexity of form or decoration which allows of instant identification in derivative cultures. Unfortunately, this is often the case with the unornamented pottery groups of the later Neolithic for we can seldom be quite secure in our knowledge of what is really typical and what is due to a common tradition in the potters' art over a large area. The possibility of this identification is also limited in early cultures when ceramic techniques are weakly developed.

Our deductions have been based on the indirect evidence derived from the common fund of forms in what is thought to be the parent culture and those in the fully-developed early phase of the culture whose origins are in question, modified by elements assimilated in passage. The possibilities for error with this method are large indeed, and several alternative explanations with seemingly equal validity may be offered for the same evidence. The probability that the new culture will develop forms or decoration which have no obvious forerunner in the parent culture is more likely than not. These new phenomena, not present in the parent culture and not obviously derived from contemporary neighbours by the normal processes of cultural interchange, paradoxically, may have to be discounted in examining the origin problem. In many cases, these new forms unfortunately serve as the "type fossils" for the culture in question, and we are in the unenviable position where we must disregard the very elements which conventionally serve to identify the culture whose origins are sought. However, by restricting our choice of significant forms too severely to avoid this contradiction, we finish by merely identifying a common tradition of ceramic techniques in a given geographical area, a tradition common to a great number of cultures and an identification which is devoid of historical significance.

Dealing with this problem with respect to North America in a period very analogous to the late Neolithic in central Europe--that is, immediately prior to the European conquest--where the ethnographic information is

such that the approximate position of most important ethnic units is known, one early student pointed out that: "Notwithstanding...the very decided advantages of the ceramic art over other arts as a record...its shortcomings are apparent:.....parallelisms...between arts of widely separated peoples of like grade of culture and like environment...interchanges by trade, multiple occupation of sites, adoption of pottery making captives, and the amalgamation of communities; by all of these means works of distinct families of people may in case be thrown into such close association as to make ethnic determinations difficult and uncertain....We soon observe that the pottery of one section differs from that of another in material form, color and decoration, and that groups may be defined each probably representing a limited group of peoples, but more conveniently treated as the product of a more or less well-marked specialization area. Although they are confined to such definite geographic areas, we are not at all sure, as has been pointed out, that these groups of ware will be found to have any intelligible correspondence with the stocks of people that have at one time or another occupied the regions, for varieties of art phenomena are often regional rather than ethnic"[1].

However, it is our opinion that only a very detailed study can resolve the problem where more general surveys may fail. The degree to which we limit our choice of forms, forms deemed significant for a particular problem, is a largely subjective matter based upon previous experience and prejudices. We can materially alter our conclusions by restricting the material to a very few types,

[1]Holmes 1903.

as Vogt and Becker have done. Clearly, the widest variety of types and techniques must be allowed to remain in the balance of judgment. By types are meant strictly defined forms which recur a perceptible number of times, preferably at several sites. Just how wide is the variety of types (under which are included, apart from pottery, specialized settlement and burial forms, small objects in all materials, etc.) which may be used to characterize the given group depends upon our knowledge not only of the given culture, but also of that of its neighbours and presumed predecessors in any area it may have occupied. Since both its neighbours and predecessors must necessarily be subject to the same scrutiny, it becomes clear that a complex interlocking web of relationships has to be simultaneously untangled. Any new evidence which arises in a far corner of the tangled skein can change the entire picture to a degree far out of proportion to its local importance.

Appendix I

Distribution Map of the Michelsberg Culture

Previous attempts at a distribution map of the Michelsberg culture include those of Schliz[1], Wahle[2], Buttler[3], Dauber[4] and Kimmig[5]. These maps have been checked by the writer against the published or museum material and only those points have been plotted which, together with the unpublished finds in various museums, belong with some certainty to the Michelsberg culture in its various subgroups.

Where the museum is indicated, the writer has seen the finds and, in most cases, drawn them; where a reference only is given, the finds have been lost or destroyed. This is also indicated by a (d) following the name of the museum. Where the finds probably still exist but were inaccessible, an (i) follows the museum name; where uncertain, a (?) follows.

Some of the other culture groups discussed in the text, including the Pfyn and Schussenried cultures, are listed in the table but not plotted on the map. This has also been done with the questionable central German outliers and similar sites in northern France, for in both cases, both the finds and adequate illustrations of them were inaccessible to the writer.

The dashed lines indicate the approximate extent of each group, but should in no way be considered as actual boundaries. They are designed merely as optical

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[1]Schliz, 1906, along with other cultures as "Pfahlbaukeramik".

[2]Wahle 1920.

[3]Buttler 1938, where points are not separated from those of the Cortaillod culture, the Pfyn culture and, in addition, many questionable outliers are included, giving the distribution a much less compact character than it deserves. See the critique in Kimmig 1947 for the finds in S. Baden and the Bodensee area plotted by Buttler.

[4]In appendix to Wahle 1937.

[5]Kimmig 1949/50.

aides in fixing the attention of the eye on each area in turn. It is highly probable that the gaps between the groups as shown do not exist in reality, but represent gaps in research. This is surely the case with the gap between the Alsace and Classical groups. Here the gap represents the poorly-explored Forêt de Hagenau and the boundary between the research areas of the Denkmalpflege of north and south Baden. A similar gap between the eastern spur of the Rhineland group and the northern segment of the Classical group is of the same nature, but that between the Belgian and Rhineland group seems much firmer. The isolated position of the Bohemian group seems fairly sure, as are the isolation of the various scattered outliers around which no dashed lines have been drawn. The gap between the South Rhine group and the Alsace finds seems sharp enough in the material, though the distances involved are so small that it is difficult to believe that the separation is so complete.

The dashed line surrounding the Belgian group is left open toward the west, for it is not known from sure ceramic finds just how far into northern France this group extends[1].

Where two or more sites occur close together, a single point only is plotted, with the exception of those in the region around Prague. All sites are listed however in the table which follows.

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[1]The author is indebted to M.H. Mariette of Samer, Pas-de Calais for calling his attention to finds made at "la Montagne", Lumbres (Pas-de-Calais) by Dom R. Prévost of the Abbaye de Wisques. M. Mariette states that the pottery from this site corresponds with that which we have described as the Belgian group and hence may represent part of its hypothetical western extension. The writer had not seen the finds at the time the manuscript was completed.

The Classical Group

Albig kr. Alzey ref Reinecke 1900a, Mainz Stadt Museum (d)

Alzey kr. Alzey-Wartberg ref Alzey Museum

Bingen kr. Bingen ref Mainz Stadt Museum

Bockenau kr. Kreuznach-Stromberg ref Dehn 1941, Kreuznach Museum.

Bühl kr. Ludwigshafen-Gemeindewald ref GER 17 1933 62, 229.

Büttelborn kr. Gross Gerau ref Darmstadt Museum, Schumacher 1913/15.

Butterstadt kr. Hanau-Tannenkopfs ref Kutsch 1926, Wolff 1919, Hanau Museum (?).

Delkenheim kr. Main Taunus- Sandgrube Koch ref Wiesbaden Museum (d), GER 21 1937 134.

Echzel kr. Budingen ref Jorns 1951, Budingen Museum (?)

Ehrenstein kr. Ulm ref Ulm Museum, Paret 1955, Zürn 1958.

Elsbethen kr. Salzburg-Grillberg (Austria) ref Hell 1944/50

Finthen kr. Mainz-Donnersberg ref Mainz Stadt Museum, Behrens 1927

Flörsheim kr. Main Taunus ref Wiesbaden Museum, GER 10 1926 161

Gerlachsheim kr. Tauberbischofsheim ref BF 1951 pl. 16 & 124.

Glauberg kr. Budingen ref Richter 1933/4, Glauberg Museum (d), Giessen (Univ.) Museum.

Gronau kr. Hanau-Hechenwingert ref Wolff 1919, Hanau Museum (?)

Gross Umstadt kr. Dieburg ref Darmstadt Museum (part d), Schumacher 1913 with earlier refs, Behn 1925/36, Koch 1937.

Harxheim kr. Kirchembeimbol ref Speyer Museum, Sprater 1948, GER 20 1935 59.

Hasloch kr. Hasloch ref Speyer Museum (i), Sprater 1915

Hechtsheim kr. Mainz ref Mainz Stadt Museum, Stümpel 1957

Heidelsheim kr. Bruchsal ref Denkmalpfleger, Karlsruhe, forthcoming BF.

Heubach kr. Dieburg ref Darmstadt Museum, Jorns 1953

Höheneck kr. Ludwigsburg-Täle, Hungersberg ref Stuttgart Museum (part d), Paret 1921.

Iggelheim kr. Ludwigshafen ref Speyer Museum

Ingelheim kr. Bingen ref Mainz Stadt Museum, Worms Museum, Behrens 1927

Insheim kr. Landau ref Speyer Museum, Sprater 1928

Kirrweiler kr. Landau ref GER 12 1928 204

Kleinlinden kr. Friedburg ref Kunkel 1926

Kreuznach kr. Kreuznach-Nauberg, Martinsberg, Im Tale Links, ref Kreuznach Museum (?), Dehn 1941.

Landau kr. Landau ref Speyer Museum (casts), Munich Museum (d), Sprater 1928.

Laubenheim kr. Kreuznach ref Kreuznach Museum, Dehn 1941

Meisenheim kr. Kreuznach ref Kreuznach Museum, BJ 145 1940 214

Mittelbuchen kr. Hanau-Lützel Berg, Wiesborn, Opifizius Brick works, ref Hanau Museum (?), Wolff 1919.

Monsheim kr. Worms ref Worms Museum, Behrens 1927

Mörzheim kr. Landau ref Speyer Museum

Neckargartach kr. Heilbronn ref Stuttgart Museum (part d), Paret 1930/32, 1935/8, GER 15 1931 296

Neubamberg kr. Alzey-Galgenberg ref Alzey Museum, Behrens 1921, Behrens 1927

Nordlingen kr. Neresheim-Goldberg ref Stuttgart Museum (part d) Nordlingen Museum, ref Bersu 1936, 37, Dehn & Sangmeister 1954.

Obereisesheim kr. Heilbronn-Hätzenberg ref Stuttgart Museum

Obergrombach kr. Sinsheim ref GER 21 1937 25,

Ober Olm kr. Mainz ref Reinecke 1900a

Oberwölstadt kr. Friedberg ref Kunkel 1926

Ostheim kr. Hanau-Hechenwingert ref Wolff 1919, Hanau Museum (?)

Praunheim kr. Frankfurt/Main ref Frankfurt Museum, GER 17 1933 139

Raibach kr. Dieburg ref Jorns 1953, Darmstadt Museum (i)

Raventhal kr. Wiesbaden ref Wiesbaden Museum

Salzburg, (Austria)-Rainberg ref Hell 1926

Sarmsheim kr. Kreuznach-Trollmühle ref Bonn Museum, Dehn 1941, Müller 1953, Kreuznach Museum(?)

Untergrombach kr. Bruchsal-Michelsberg ref Karlsrühe, RGZM, Bruchsal (most d), Heidelberg, Konstanz, Köln, Berlin Museums, Bonnet 1899, Dauber 1951 Auberg ref Wahl1925, Bruchsal Museum (part d).

Vendersheim kr. Oppenheim ref Mainz Stadt Museum, Behrens 1927

Wartemberg kr. Erding ref Reinecke 1929

Weilheim kr. Kircheim-Limburg ref Gössler 1914/16, Rieth 1938

Wiesbaden- Adolfshöhe ref Wiesbaden Museum

Wimpfen kr. Heppenhiem-Altembamberg ref Speyer Museum, Schumacher 1921

Wörrstadt kr. Oppenheim ref Mainz Stadt Museum, Behrens 1927

Zoltingen kr. Dillingen ref Nordlingen Museum, Dehn & Sangmeister 1954.

The Rhineland-North Hesse Group

Aachen kr. Aachen-Lousberg ref Aachen Museum (part d), Köln Museum (i), Liese 1930, 1934

Altenrath kr. Siegkreis-Wäsche, Rosengarten ref Köln Museum (i), Marschall et al 1954, BJ 142 1937 278.

Bendorf kr. Koblenz ref Bonn Museum (d), Müller 1953

Besse kr. Fritzlar ref Kassel Museum, Uenze 1956

Böhne kr. Waldeck-Sengelberg ref Kassel Museum, Müller-Karpe 1951

Döhren kr. Mull ref Hannover Museum (?), Muller 1953

Eberstadt kr. Giessen ref Bremer 1913, Kunkel 1926

Edersee kr. der Eder-Hünselberg ref Uenze 1956

Emmerich kr. Rees ref Bonn Museum (d) Müller1953, Buttler 1938

Fritzlar kr. Fritzlar-Buraberg ref Müller-Karpe 1951

Gering kr. Mayen ref Bonn Museum (d) Lehner 1922, 1916, PZ 5 1913 560, Mannus 6 1914 48

Gladbach kr. Neuwied ref Neuwied Museum, Eich 1933

Grinseldorf kr. Marburg-Dingelberg ref Uenze 1956

Grossenritte kr. Kassel-Burgberg ref Kassel Museum, Müller-Karpe 1951

Hertingshausen kr. Kassel- die Klippen ref Kassel Museum, Uenze 1956, Müller-Karpe 1951

Irlich kr. Neuwied ref BJ 148 1948 339

Kaltenengers kr. Koblenz ref Bonn Museum (d) Tackenberg 1954

Koblenz kr. Koblenz-Arzheim, Dommelsberg ref Koblenz Museum (d) Tackenberg 1954, BJ 142 1937 280, 288

Kollig kr. Mayen ref Mayen Museum (i), Bonn Museum (d), BJ 142 1937 211, 264; 146 1941 245

Kottenheim kr. Mayen ref Köln Museum (i), Lung 1939, BJ 125 1919 Beilage 2.

Mayen kr. Mayen-Erdwerk, Katzenberg, Sauperg ref Köln Museum (i), Mayen Museum, Lehner 1910 a&b, Rademacher 1913 Bonn Museum (d)

Miel kr. Bonn ref Bonn Museum (d) BJ 127 1922 268

Niedenstein,kr. Fritzlar-Altenberg (part to Classical Group)- ref Bersu 1928, Hofmeister 1930, Müller-Karpe 1951 Kassel Museum.

Niedermendig kr. Mayen ref Bonn Museum (d), Tackenberg 1954 unpublished earthwork (Röder).

Pörz kr. Rhenisch Bergisch- Wahn, Scheuerbusch, Westhofen refs Köln Museum (i), Bonn Museum(d) Marschall et al 1954 with further refs, GER 20 1936 57

Rhens-Bray kr. Koblenz ref Koblenz Museum (d) Tackenberg 1954

Romersberg kr. Fritzlar-Altenberg ref Müller Karpe 1951

Sieglar-Siegkreis ref Köln Museum (i), Marschall 1954, NDV 13 1937 95

Urmitz kr. Koblenz (also listed under Kärlich, Weissenthurm in collections) ref Bonn Museum, Koblenz Museum (d) Lehner 1910a, 1903, Rest 1940, Röder 1951

Werschau kr. Limburg ref Wiesbaden Museum, Mandera 1957

Wiera kr. Ziegenhain ref Kassel Museum, Uenze 1956, Bergmann 1956

Zierenberg kr. Wolfhagen ref Uenze 1956

The Alsace-S. Baden Group, French Outliers

Aschenheim near Strasbourg ref Strasbourg Museum, Forrer 1913, 1922, Schaeffer 1925

Bollweiler near Soultz ref Kimmig 1947

Burkheim kr. Freiburg ref Kimmig 1947, Freiburg Museum

Chassey near Lons-le-Saunier ref Lons-le-Saunier Museum, Bailloud 1955

Colmar ref Kimmig 1947

Cronenbourg near Strasbourg ref Strasbourg Museum, Goehner 1939

Ebringen kr. Freiburg-Schönberg ref Freiburg Museum, Buttler 1938, Kimmig 1947 (see Maier 1958 for objections)

Eichstetten kr. Freiburg ref Freiburg Museum, BF 1948/50 207

Endingen kr. Freiburg ref BF 1948/50 209

Handschuheim near Huitigheim ref Stieber 1953

Hönbolzheim kr. Emmendingen ref Maier 1958 (questionable, not plotted)

Höhnheim near Schiltigheim ref Bersu 1910, Forrer 1913, Strasbourg Museum

Ihringen kr. Freiburg-Burghalde, Totenhöle ref Kimmig 1947 (see Maier 1958 for objections)

Istein kr. Lorrach ref Maier 1958

Jechtingen kr. Emmendingen ref Kimmig 1947, Freiburg Museum

Katzenthal near Kaysersberg ref Glory 1942, Winkler 1899

Kenzingen kr. Emmendingen ref Maier 1958

Kirchofen kr. Freiburg ref Maier 1958

Kleinkems kr. Lorrach ref Freiburg Museum, Lais 1948-52

Königschaffhausen kr. Emmendingen ref Freiburg Museum

Krozingen kr. Müllheim ref Freiburg Museum, Kimmig 1947

Leiselheim kr. Emmendingen ref Freiburg Museum, BF 1948 pl 35

Lingolsheim near Illkirch-Graffenstaden ref Strasbourg Museum, Forrer 1922.

Malterdingen, kr. Emmendingen ref Maier 1958 (questionable, not plotted)

Montmorot near Lons-le-Saunier ref Lons-le-Saunier Museum

Mont Vaudois near Belfort ref Belfort Museum, Bailloud 1955 Glory 1942, De La Noe 1887

Mundolsheim near Strasbourg ref Strasbourg Museum, Forrer 1922

Munzingen kr. Freiburg ref Freiburg Museum, Kimmig 1947, Maier 1958.

Niedereggenen kr. Mullheim-Haagschutz ref Freiburg Museum, Kimmig 1947 (with earlier refs), (but see Maier 1958 for objections).

Norsingen kr. Freiburg ref Kimmig 1947

Oberschaffolsheim near Strasburg-Mussau ref Strasbourg Museum, Forrer 1912.

Riegel kr. Emmendingen ref Freiburg Museum, Kimmig 1947

Schiltigheim near Strasbourg ref Strasbourg Museum (cast)

Strasbourg-Gare ref Strasbourg Museum, Forrer 1912

Stutzheim near Truchtersheim ref Stieber 1952

Tiengen kr. Freiburg ref Maier 1958 (questionable not plotted).

Wingersheim near Hochfelden ref Kimmig 1947

Wolfenweiler kr. Freiburg ref Maier 1948

The South Rhine-Bodensee Group

Altenberg kr. Waldshut ref Kraft 1929, Freiburg Museum (d).

Berg kt. Thurgau-Heimenlachen ref Frauenfeld Museum, Keller 1925

Bodman kr. Stockach- Bodman, Schachen, ref Konstanz Museum, RGZM, Köln (i), Schumacher 1899a

Bottinghofen-Helebarden ref Frauenfeld Museum, Tatarinoff 1912

Bühl in Kettgau ref Kraft 1929, Wagner 1908

Eschenz-Insel Werd ref Frauenfeld Museum

Herblingen kt. Schaffhausen ref Vogt 1934

Heudorf kr. Stockach ref Kraft 1929, Wagner 1908

Litzelstetten I, II, III kr. Konstanz ref Konstanz Museum, BF 1951 pl 14

Maurach kr. Uberlingen ref Schumacher 1899a

Niederwil-Garschang ref Zurich Museum, Frauenfeld Museum, Ebert Reallex., Schwiez pl. 124

Olten kt. Soluthurn ref Tatarinoff 1919

Ossingen kt. Thurgau ref Zurich Museum

Sipplingen kr. Uberlingen ref Konstanz Museum, Uberlingen Museum, Reinerth 1932

Steckborn kt. Thurgau, Schanz, Turgi ref Frauenfeld Museum, Keller 1948, Keller 1925

Thayngen kt. Schaffhausen-Weier ref Schaffhausen Museum, Sulzberger 1924, Guyan 1955

Uberlingen kr. Uberlingen ref RGZM, Uberlingen Museum

Unteruhldingen kr. Uberlingen ref Schumacher 1899a (questionable not plotted).

Wangen kr. Konstanz ref Ebert Reallex. Wangen, Buttler 1938, BF 1948/50 125

Wilchingen kt. Schaffhausen ref Schaffhausen Museum, Guyan 1949/50 (with caution)

The Belgian Group

Antwerp ref Genard 1948, DeLaet 1958 fig. 22, Antwerp Museum

Avennes prov. Liège ref De Loe 1894, Destexhe 1947, Colman 1954, Collection Destexhe

Boitsfort prov. Brabant ref MRAH Brussels, De Loe & Rahir 1924, Marien 1952a

Furfooz prov. Namur-Trou de Frontal, Abri de la Tranchée ref Dupont 1871, Rahir 1925, MHN Brussels

Lommel prov. Antwerp-Kattenbos ref Lommel Museum, De Laet 1950

Lumbres dep. Pas de Calais ref p.285& Arnal/Burnez 1957

Ottenbourg prov. Brabant ref Rahir 1929, MRAH Brussels.

Spiennes prov. Hainaut (also surrounding communes including Asquillies, Bougnies, Ciply, Cuesmes, Flénu, Hyon, Jemappes, Mesvin, Mons, Nouvelles, Havré, St. Symphorien, Obourg, Vellereille-le-Sec refs Cels 1889, De Loe & De Munck 1889, De Pauw 1889, 1907 De Munck 1886/7, 1900, De Loe 1925, 1928, 1929 Hamal 1925, Brüer 1930, Colman 1954, Scollar 1955, Colman 1957.

Zwijndrecht prov. Antwerp ref St. Niklaas Museum, De Pauw 1904/5

The Bohemian Group

Dáblice ref Prague Museum, Stocky 1929, pl. 107

Kazin ok. Smíchov ref Prague NM, PA 29 1917 157

Komořany ok. Most ref Vienna Museum, Hoernes 1905, PA 32 1921 14
141

Libiš ok. Neratovice ref Prague NM (d) Stocky 1929 fig. 62

Liběšovice ok. Žatec ref Žatec Museum

Ohře Valley (unspecified) Vienna Museum, Hoernes 1905

Prague-Bubenec, Troja, Sárka, Krč, Liben, ref Prague NM,
City Museum, Univ. Coll., Stocky 1929, Schranil 1929

Souš ok. Most ref Preidel 1934

Uhřetice ok. Chrudim ref Prague Univ. Coll., Stocky 1929

Usti ok. Litomeřice ref Litomeřice Museum

Veneřov ok. Karlovy Vary ref Vienna Museum, Hoernes 1905

The Schussenried Culture (not plotted)

Bischoffshingen kr. Emmendingen ref Freiburg Museum, Gutmann
1930, Maier 1958

Canstatt kr. Stuttgart-Stieg ref Stuttgart Museum (part d)
Paret 1924, 1949

Ehrenstein kr. Ulm ref Ulm Museum, Paret 1955

Feuerbach kr. Müllheim ref FS 1909 6f.

Gablenberg kr. Stuttgart-Raichberg ref Paret 1949

Harteneck kr. Ludwigsburg ref Paret 1955, Stuttgart Museum
(part d).

Ludwigsburg kr. Ludwigsburg ref Schumacher 1899b, Gössler 1914/
16, Stuttgart Museum (part d).

Raltenthal kr. Stuttgart ref Paret 1949

Rechtenstein kr. Ehingen ref BRGK 7 1912 99

Olreutzer See near Federsee ref Paret 1924, Reinerth 1936

Kornthal kr. Stuttgart ref FS 1923

Riedschachen/Federsee ref Reinerth 1923

Schussenried-Steinhauser Ried ref Stuttgart Museum (part d) Berlin Museum, Tubingen Univ. Coll., Frank 1876, Gössler 1912, Schumacher 1913/5

Stuttgart-Kaltental, Weil-im-Dorf ref Paret 1955

Vaihingen kr. Stuttgart-Fildern ref Gössler 1909

Zuffenhausen kr. Stuttgart-Reute, Vordernberg ref Paret 1921, 1924

The Saale Outliers, Central Germany

Merseburg kr. Merseburg ref Merseburg Museum I/668, Hübner an Ziegelweg (temporarily at Halle).

Wallendorf-Hutberg pit 151 ref Benesch 1941, Halle Museum

Halle-Kollwitz ref. Halle Museum 11713

Seiselitz kr. Camburg ref. Univ. Coll. Jena

Dolzig kr. Altenburg ref. Gera Museum, Auerbach 1932

Halle- Dölauer Heide barrow 6 ref. Halle Museum, Behrens 1958

The Pfyn Culture (incomplete) not plotted

Eschen-Lutzenguetle (Liechtenstein) ref Vaduz Museum, Vogt 1945

Koblach, Kadel, Neuberg ref Pittioni 1954

Kurzrickenbach ref Zurich Museum

Meilen kt. Zurich ref Zurich Museum

Pfyn kt. Thurgau ref Pfyn Museum, Keller 1944

Schnellenberg-Borscht (Liechtenstein) ref Vaduz Museum, Beck 1947, 1948

Storen-Wildsberg, Greifensee ref Zurich Museum, Vogt 1934

Wetzikon-Robenhausen ref Zurich Museum, Messikomer 1913

Wollishofen kt. Zurich-Hausmesser ref Zurich Museum

Doubtful Central German Sites (not plotted)

Auleben ref Auerbach 1932, Richter 1922

Gera ref Brause 1927/32

Hildesheim-Beusterberg ref Tackenberg 1951

Stöben ref Schliz 1913

Doubtful French Outliers (not plotted)

Catenoy near Liancourt ref Bailloud 1955

Epernay ref Arnal & Burnez 1957, Epernay Museum

Fort Harrouard ref Phillippe 1927

Blagy-sur-Bresle, dep. Seine Inf.-Le Campigny ref Bailloud 1955 (with earlier refs).

Salins (Chateau de) ref Bailloud 1955

Doubtful Swiss Outlier (not plotted)

Schötz kt. Luzern-Wauweiler Moos ref Buttler 1938, Reinerth 1926

Doubtful Czech Outliers (not plotted)

Františkovy Lázne ok. Cheb ref Stocky 1929, Prague NM

Hospozin ok. Kralupy ref Prague NM (d) Stocky 1929 pl 107

Jiřikovice ok. Brno ref Brno Museum Pal3241/40

Doubtful Pfyn Culture Outliers (not plotted)

Osterfingen-Weier ref Guyan 1949/50

Uerikon ref Zurich Museum

Doubtful Schussenried Culture Outliers (not plotted)

Herblingen kt. Schaffhausen-Grüthalde ref Guyan 1949/50

Eschen-Lutzenguetle (Liechtenstein) ref Zurich Museum,
Vaduz Museum, Vogt 1945

Schnellenberg-Borscht (Liechtenstein) ref Vaduz Museum,
Beck 1947/8

APPENDIX II

Michelsberg Pots with Grain Imprints

Alzey N 2.7 Neubamberg Baking plate sherd.

Bonn 20312a Mayen, Baking plate

D 99 Sarmsheim Baking plate

38,1316c Kärlich type 2/13a

38,1316d Kärlich type 2/13a

12798 Urmitz type 2/13a or d

Brussels MRAH, imprints on several pots, no numbers

Darmstadt A1948:2/A1906 Gross Umstadt type 3a

A1948:173/A1906:31 Büttelborn type 18

Frankfurt Frankfurt alpha 18327 1955/38 Praunheim type 5a

" " " Baking plate 21cm diam.

" " " type 1c 18.5cm high

" " " type 3b 18cm diam

" " " sherd, double boss lug, 15cm high

" 18317 1955/34 " type 23e

Frauenfeld 3687 Eschenz type 20a

48 Niederwil type 19c plus finger impressions

Freiburg 39:21e Kleinkems type 11

Karlsruhe C 7378 Michelsberg type 19c unornamented

C 7380 " " "

Mainz Stadt Museum 26,31b Wörrstadt type 9

0,1522 Ingelheim type 10

27,36,2 Vendersheim Baking Plate

0,1729 Hechtsheim type 19c unornamented

Mainz RGZM Michelsberg 0,1163 type 19a unornamented

" 0,1165 type 1c

Neuwied 2667 Gladbach-Lohnwald type 13c

Schaffhausen 7947 Weier type 24f unornamented

2923 " " 29b

2606 " " 1b

7949 " " 34c

2605 " " 15b

Strasbourg 40563 Lingolsheim type 1

17556 Mundolsheim type 16c

47244/45645 Strasbourg type 9a

8089/A25 Mundolsheim type 15

17442 Mundolsheim type 6d

Stuttgart G 1862 Goldberg type 5b

28010 " " 5e

Wiesbaden no number, Schierstein type 25b, 29cm high

" " " " 5b 23cm high

" " " " 19b 50cm high

" " " " 19c 30cm diam

18.75 Schierstein type 5a

14.68 " " 19b

25.60.1 Flörsheim type 5a

Worms 991 Monsheim(?) type 5a

Zurich 351 Niederwil type 11

189 Kurzrickenbach (Pfyn Culture) type 13b

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ABBREVIATIONS

ACAM Annales du Cercle Archéologique de Mons

ACTA Acta Archaeologica

AEA Anzeiger für Elsässische Altertumskunde

AJ Archaeological Journal

AIPH Archives de l'Institut de Paleontologie Humaine, Memoires

ASA Anzeiger für Schweizerischen Altertümskunde

ASAB Annales de la Société Archéologique de Bruxelles

ASGB Annales de la Société Géologique de Belgique

ASGN Annales de la Société Géologique du Nord de la France

BF Badische Fundberichte

BRGK Bericht der Römisch-Germanischen Kommission des Deutschen Archäologischen Institut

BJ Bonner Jahrbucher

BARB Bulletin de l'Academie Royale de Belgique

BCW Bulletin ... "Les Chercheurs de la Wallonie".

BIAL Bulletin de l'Institute de l'Archéologie Liègoise

BIRS Bulletin de l'Institute Royale des Sciences Naturelles de Belgique

BMRA Bulletin des Musées Royaux d'Art et d'Histoire

BSAB Bulletin de la Société Anthropologique de Bruxelles, later Société Royale Belge d'Anthropologie et Préhistoire

BSBG Bulletin de la Société Belge de Géologie, Paléontologie, et Hydrologie

BSPF Bulletin de la Société Préhistorique Française

CAHA Cahiers d'archéologie et d'histoire d'Alsace (continuation of AEA)

CFAH Congrès de la Federation Archéologique Historique de Belgique

CIAA Congrès Internationale d'Anthropologie et d'Archéologie Préhistorique, later ...Internationale des Sciences Préhistoriques et Protohistoriques

CPF Congrès Préhistorique Français

FNA Fra Nationalmuseets Arbejdsmark

FS Fundberichte aus Schwaben

GER Germania

JHVL Jahrbuch der Historischen Verein...Liechtenstein

JRAI Journal of the Royal Anthropological Institute...

JSGU Jahresbericht der Schweizerischen Gesellschaft für Urgeschichte

JMV Jahresschrift für Mitteldeutsche Vorgeschichte, formerly ...der Sächsisch-Thüringischen Länder

MAAS Mémoires de l'Academie des Arts, Sciences, et Lettres de Hainaut

MIGL Memoires de l'Institut Géologique de l'Université de Louvain

MUFS Monographien zur Ur- und Frühgeschichte der Schweiz

NA Nassauische Annalen

NDV Nachrichtenblatt für Deutschen Vorzeit

NH Nassauische Heimatblatter

PA Památky Archeologické

PPS Proceedings of the Prehistoric Society, formerly... of East Anglia

PZ Prähistorische Zeitschrift

RA Revue Anthropologique

SAC Sussex Archaeological Collections

WA Wiadomości Archeologiczne

ZE Zeitschrift für Ethnologie

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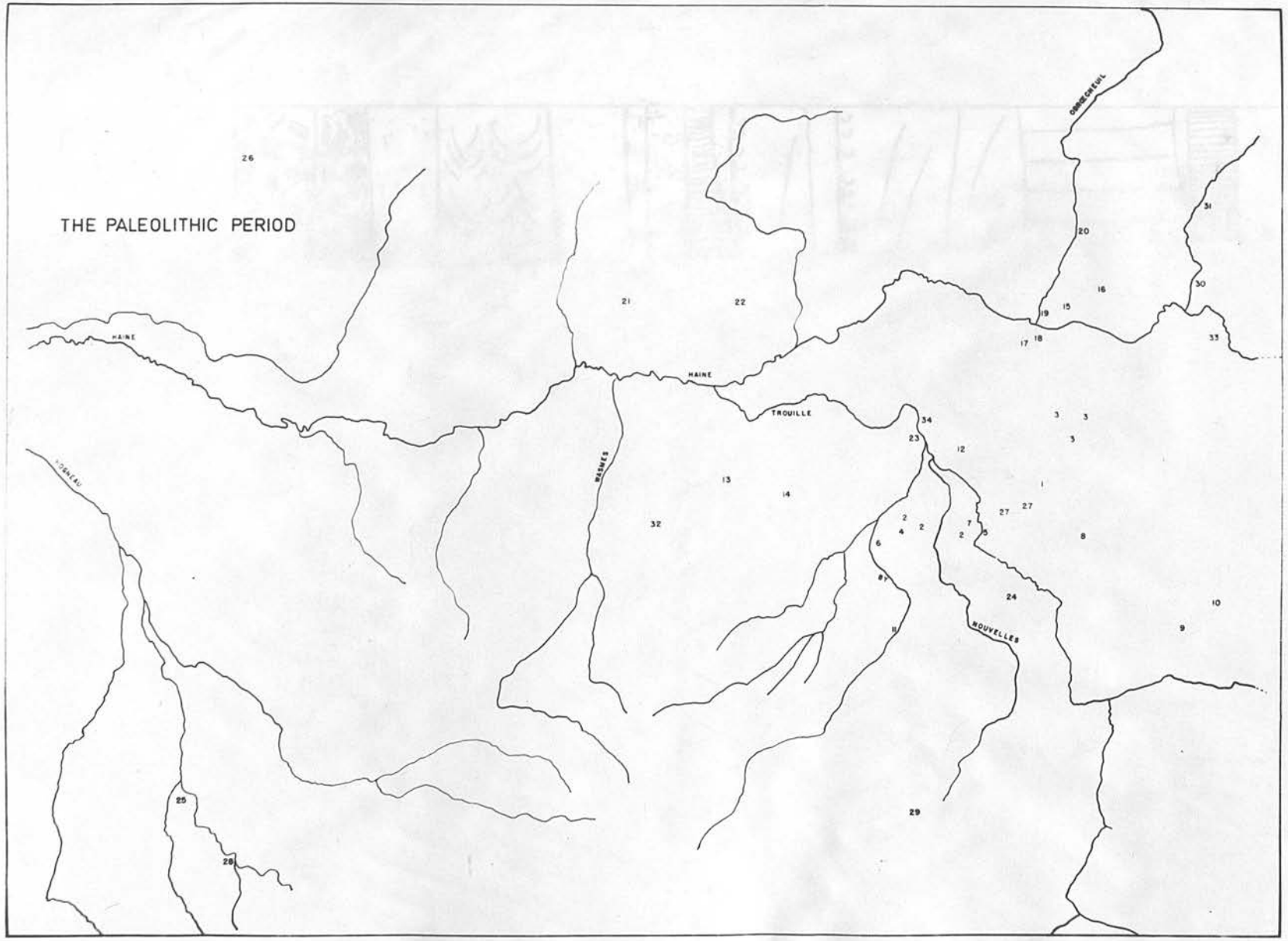
THE PALEOLITHIC PERIOD
HAINE
HAINE
TROUILLE
RESNES
NOUVELLES
ORNEAU
26
21
22
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15
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17
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Figure 1

Figure 2

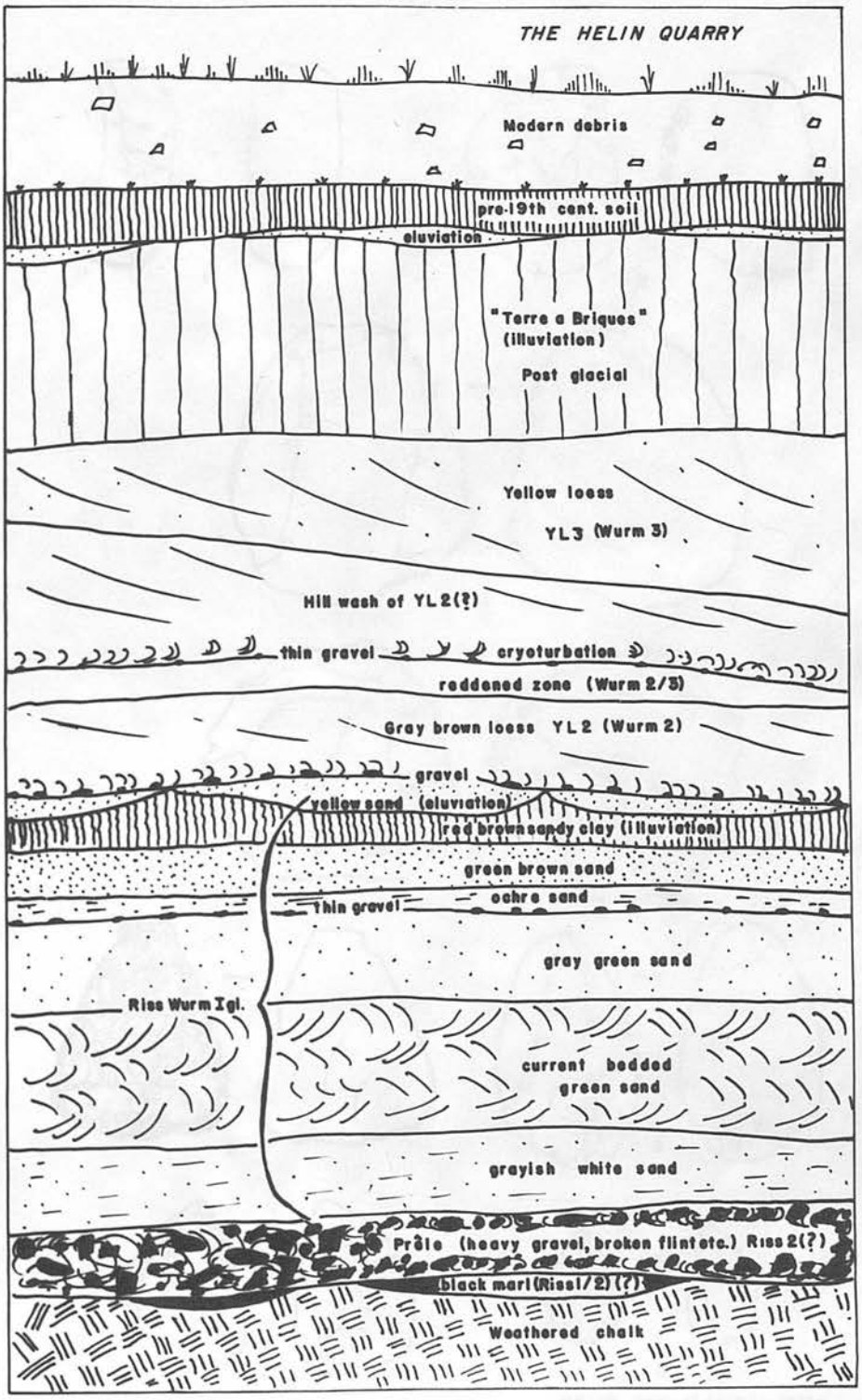
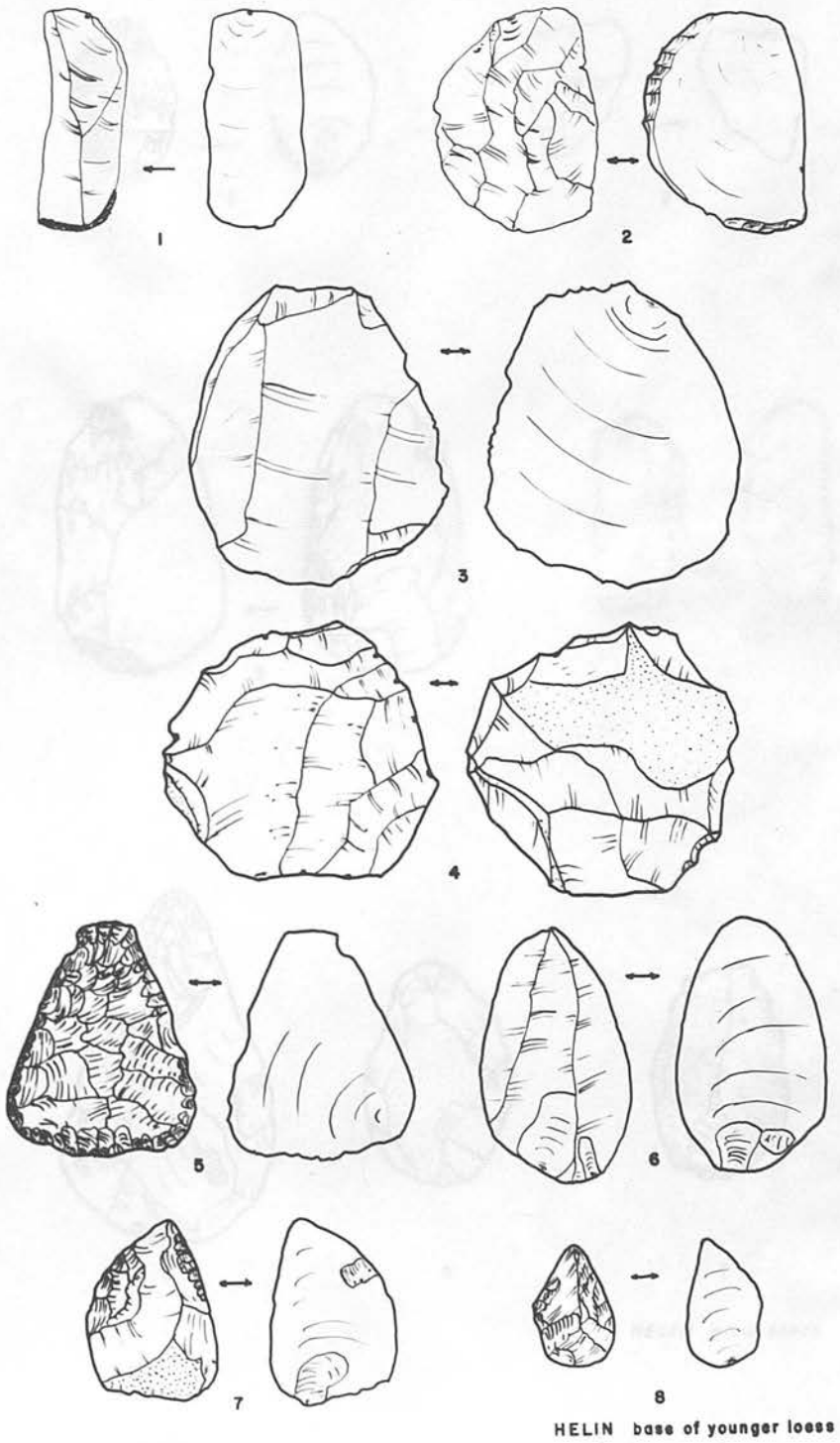
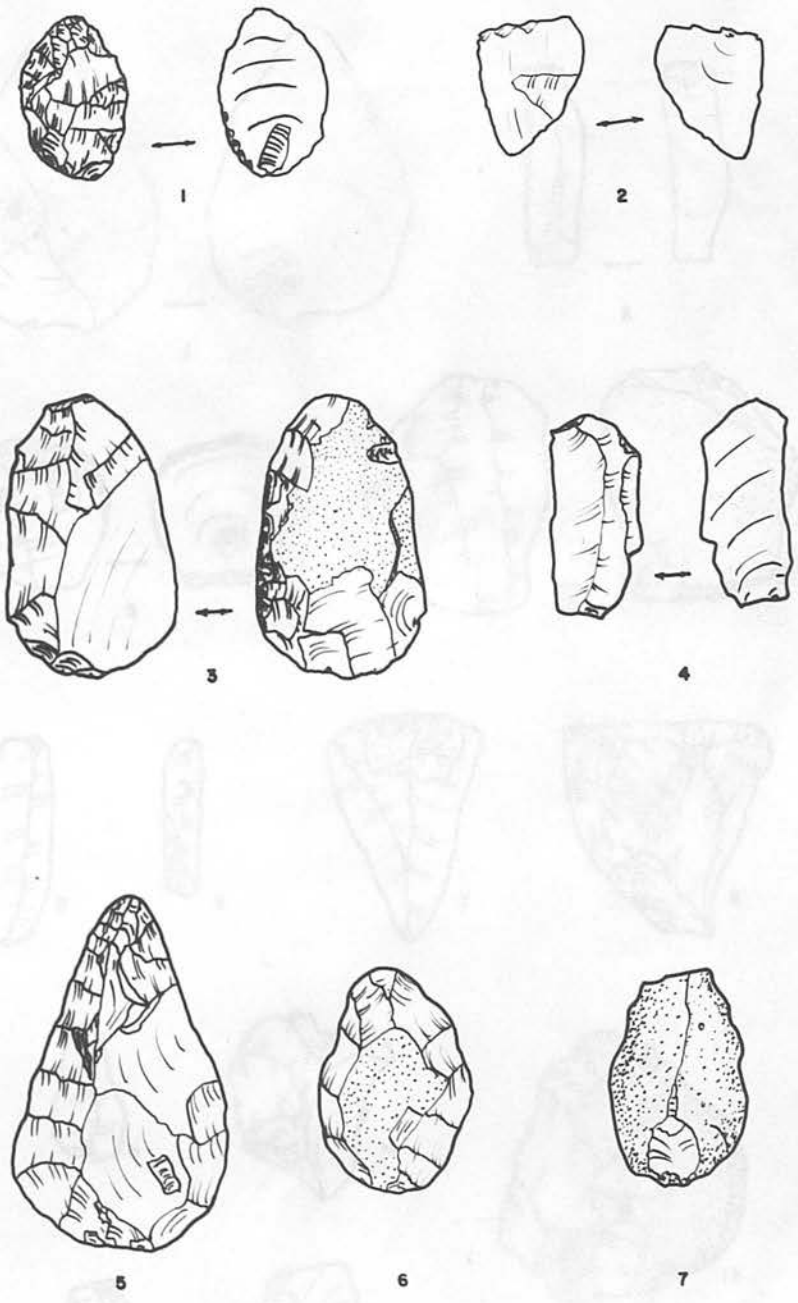

THE HELIN QUARRY
Modern debris
pre-19th cent. soil
eluviation
"Terre a Briques"
(illuviation)
Post glacial
Yellow loess
YL3 (Wurm 3)
Hill wash of YL2(?)
thin gravel
cryoturbation
reddened zone (Wurm 2/3)
Gray brown loess YL2 (Wurm 2)
gravel
yellow sand (eluviation)
red brown sandy clay (illuviation)
green brown sand
ochre sand
thin gravel
gray green sand
Riss Wurm Igl.
current bedded
green sand
grayish white sand
Prêle (heavy gravel, broken flint etc.) Riss 2(?)
black marl (Riss I/2) (?)
Weathered chalk

Figure 3



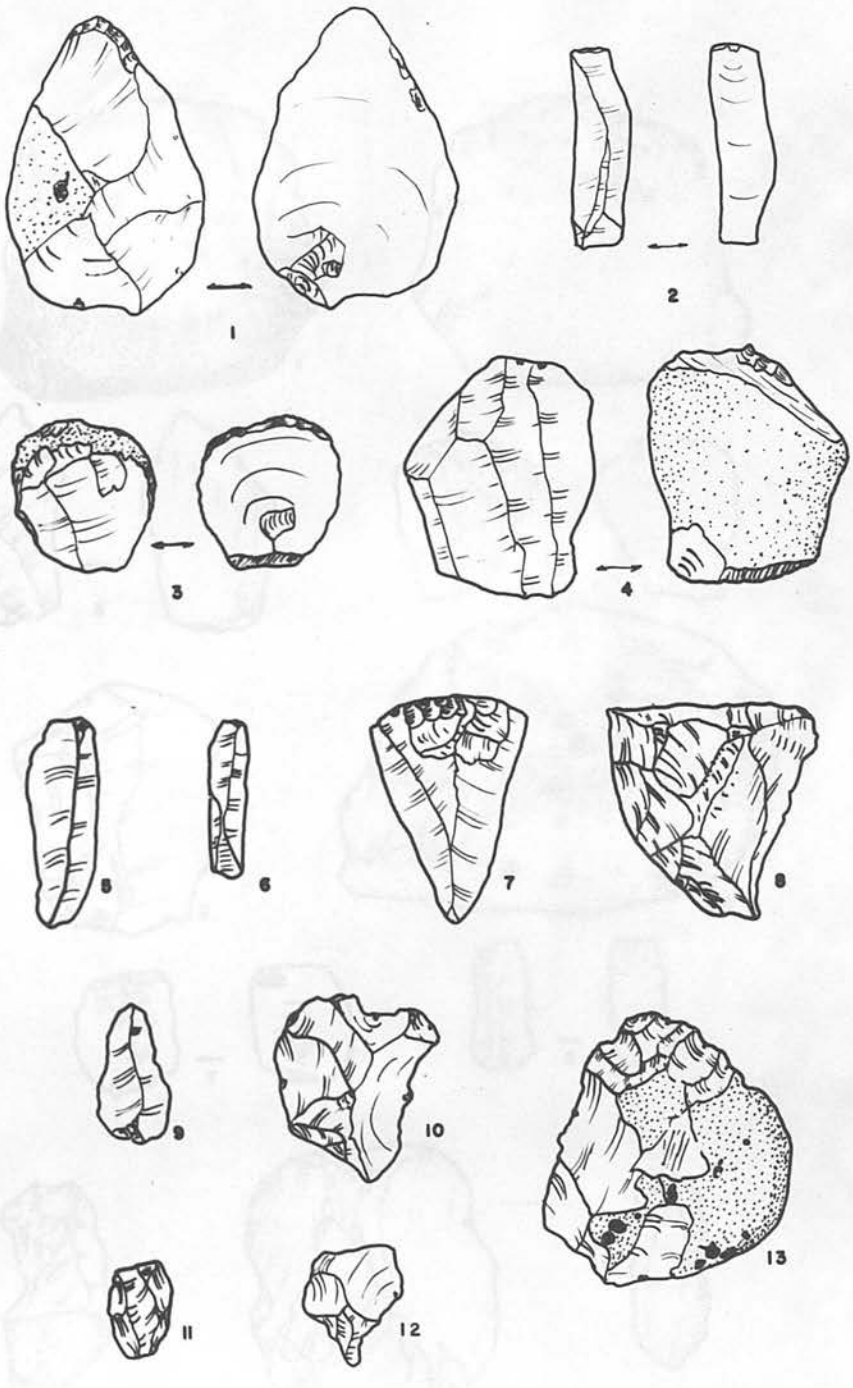
HELIN base of younger loess

Figure 4



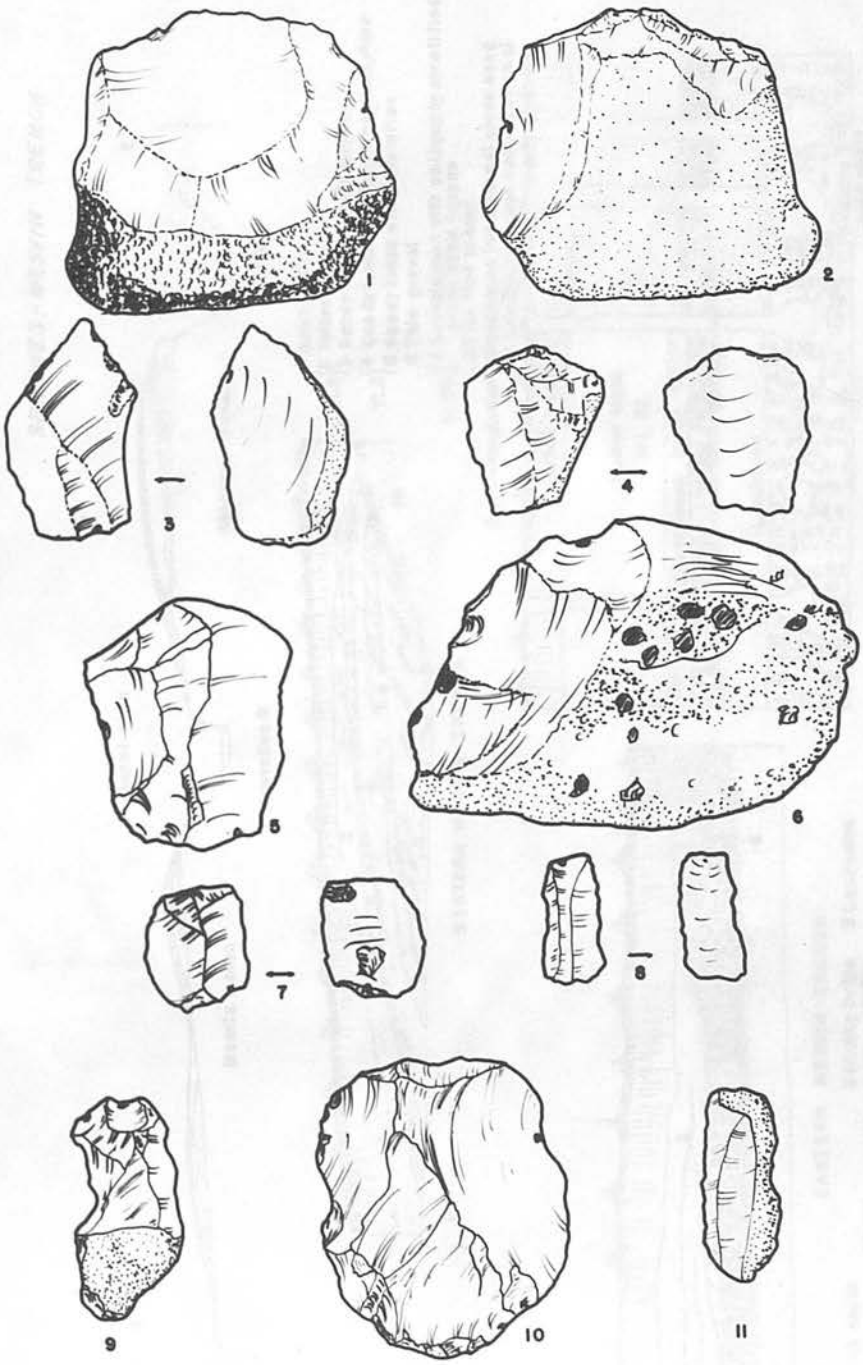
HELIN green sands

Figure 5



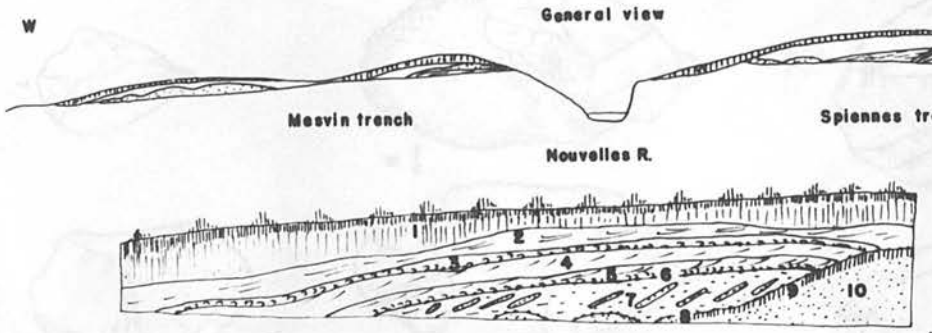
HELIN surface of Prêle

Figure 6



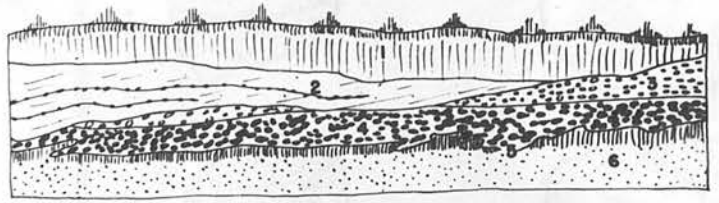
HELIN Prêle

SPIENNES - MESVIN TRENCH



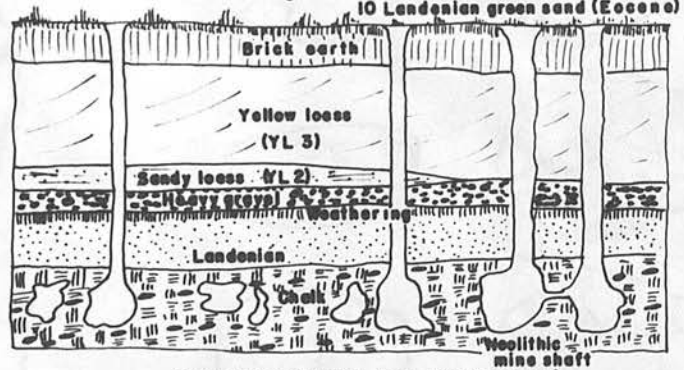
WESTERN MESVIN TRENCH

1 Brick Earth
YL3 { 2 Yellow loess
3 Sandy loess with involution
YL2 { 4 Sandy loess with *Succinea, Helix, Pupa*
5 Sandy loess with involution
6 Thin gravel
YL1(2) { 7 Loessic sand with obliquely stratified green sand lenses
8 Thin flint gravel
R W-intergiacial 9 Reddened (weathered) green sand
10 Landenian green sand (Eocene)



EASTERN MESVIN TRENCH

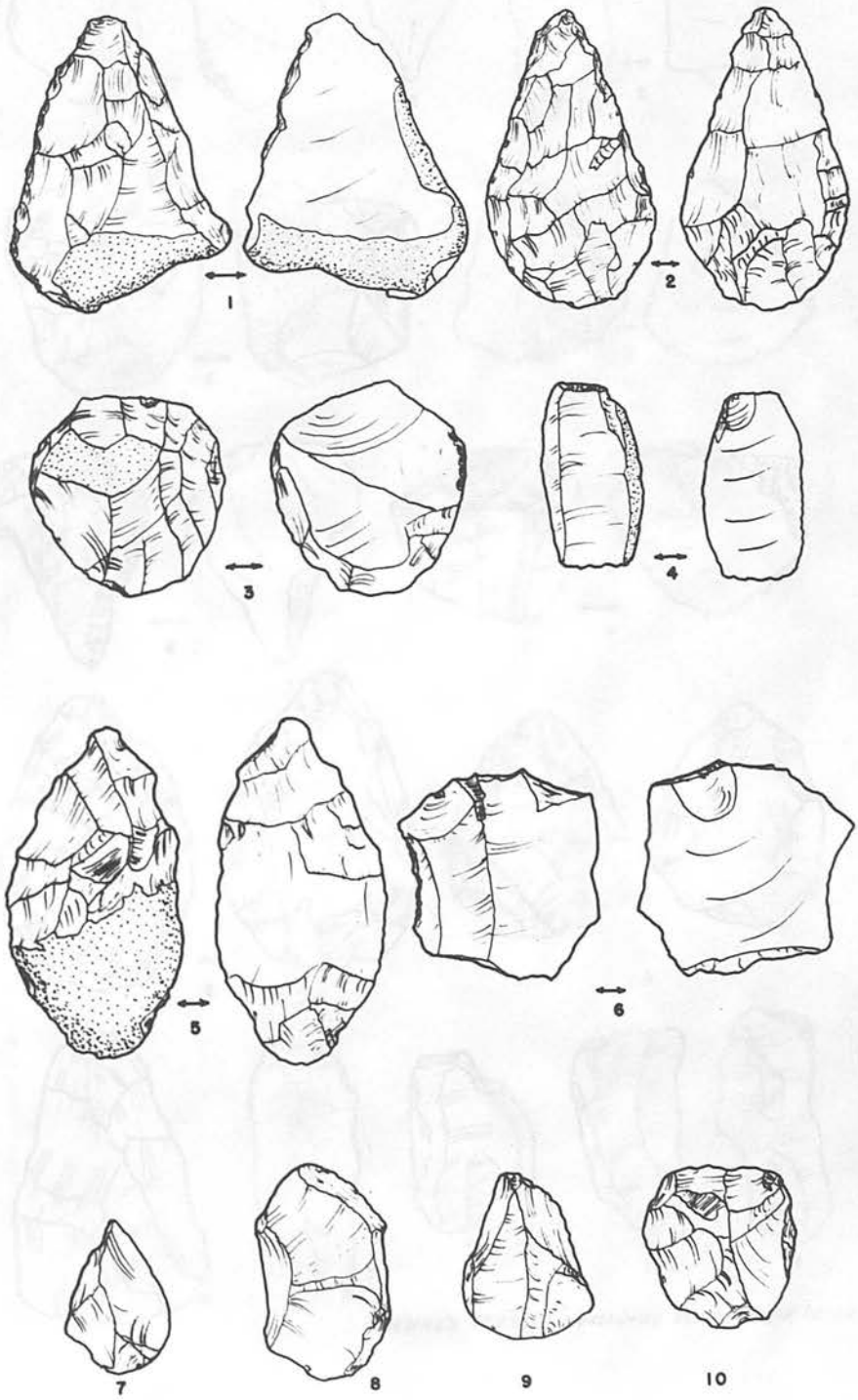
1 Brick earth
2 Yellow loess with thin gravels interspersed
3 Chalky Prêle
4 Flinty Prêle
5 Weathering
6 Landenian



SPIENNES TRENCH (see also figure 36)

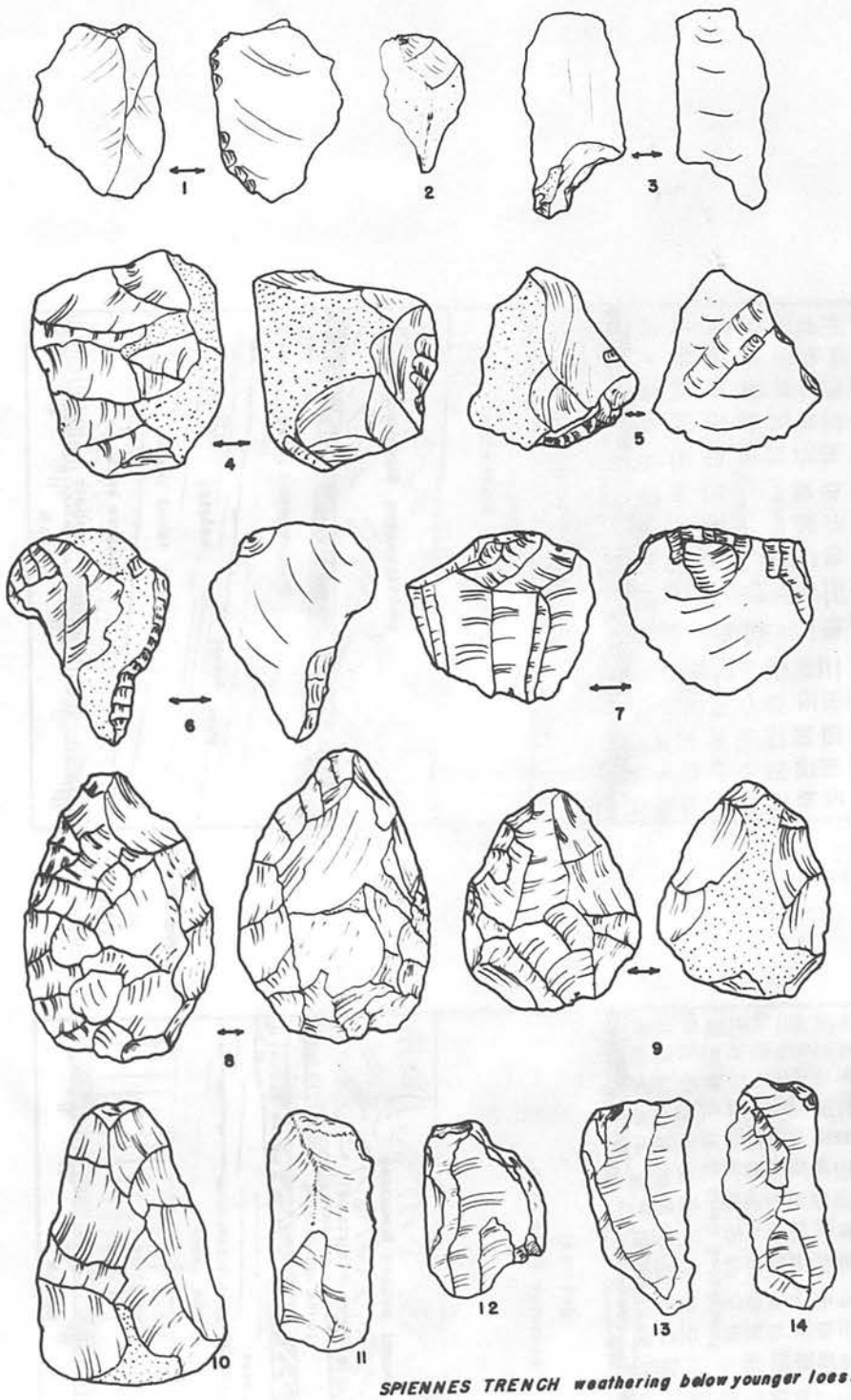
Figure 7

Figure 8



SPIENNES MESVIN TRENCH base of loess

Figure 9



SPIENNES TRENCH weathering below younger loess

Figure 10

TYPICAL SECTIONS AT ST. SYMPHORIEN
SOUTH
Humus etc.
Brick Earth
Yellow loess
Thin gravel
Sandy loess
Heavy gravel
Yellow clayey sand
Reddish weathering
Current bedded greensand
Landenian green sand
(Eocene)
Conglomerate
Phosphated Chalk
NORTH
Humus etc.
Windblow sand
Yellow sandy loess
faint gravel
(grayish)
Reddish brown loess
Gravel
Current bedded greensand
Landenian green sand
(Eocene)
(blackish)
Conglomerate
Phosphated Chalk

Figure 11

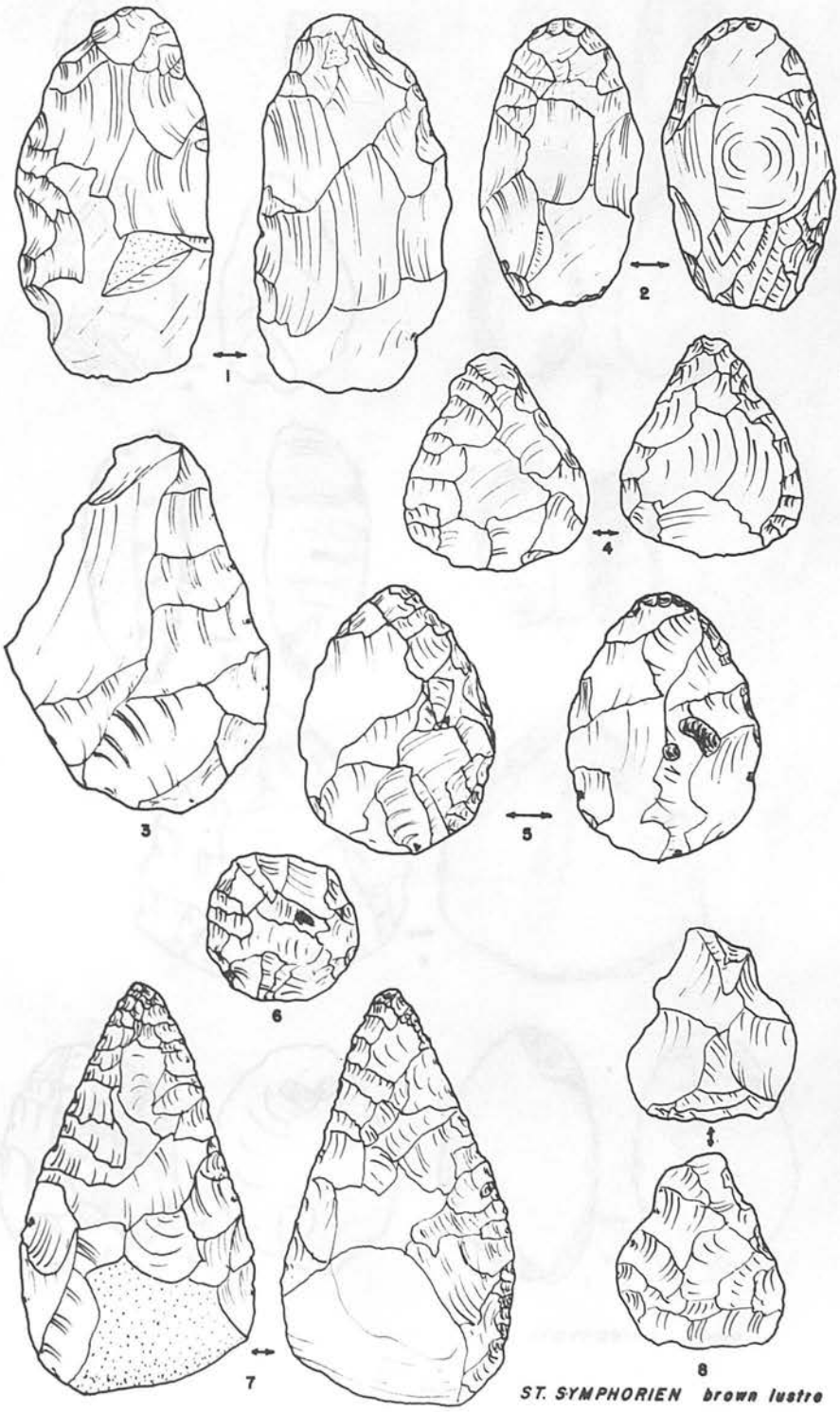
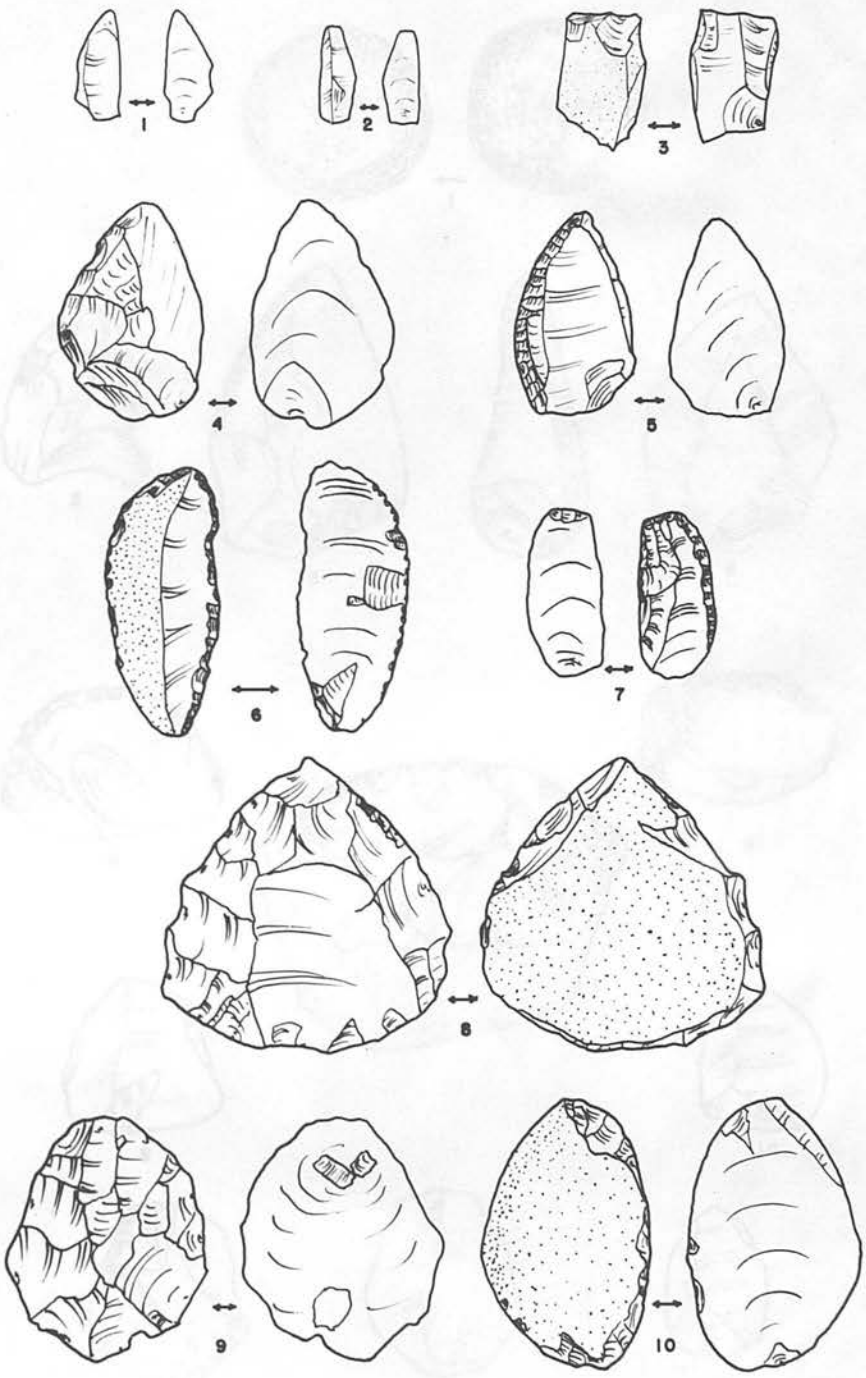
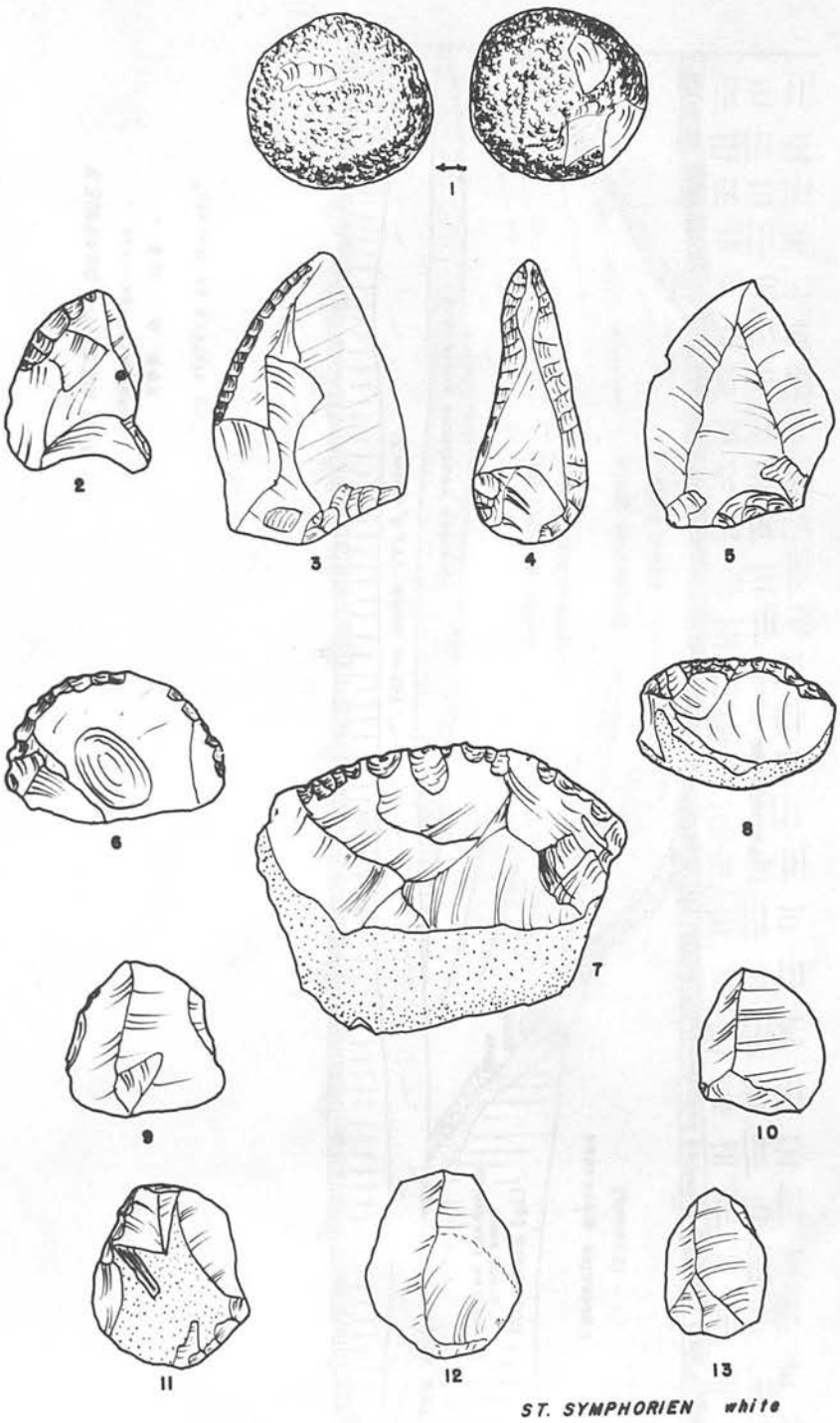


Figure 12



ST. SYMPHORIEN matte

Figure 13



ST. SYMPHORIEN white

THE MESVIN QUARRIES

cadastral parcels
296 & 328

"La rivière de Mesvin"

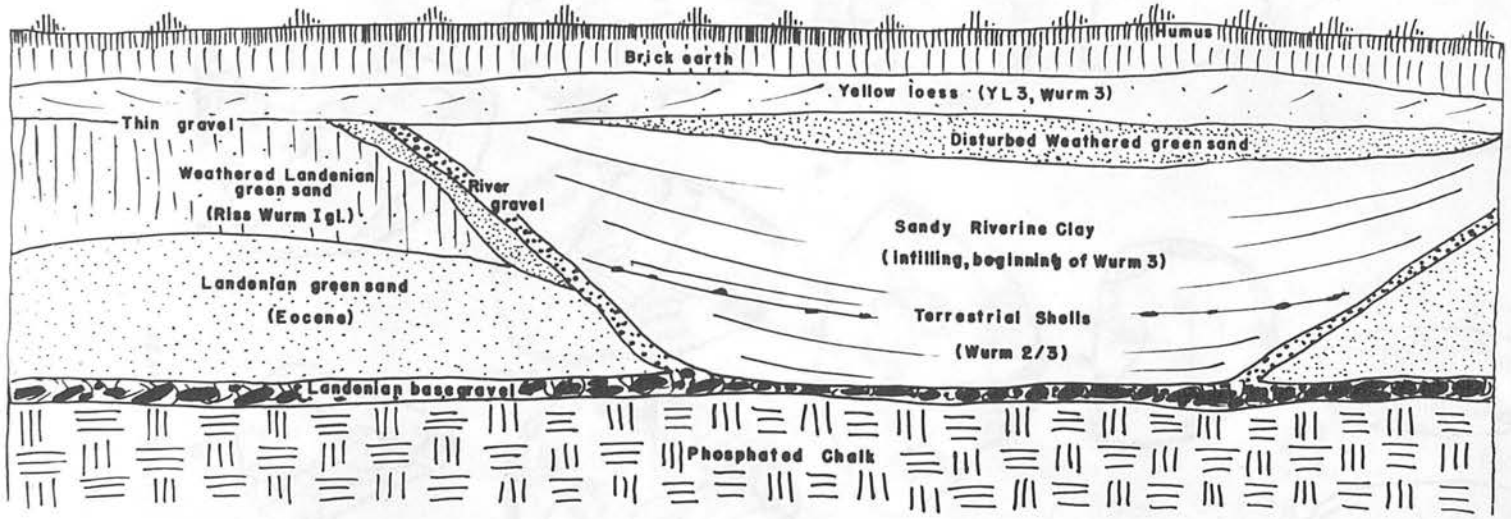
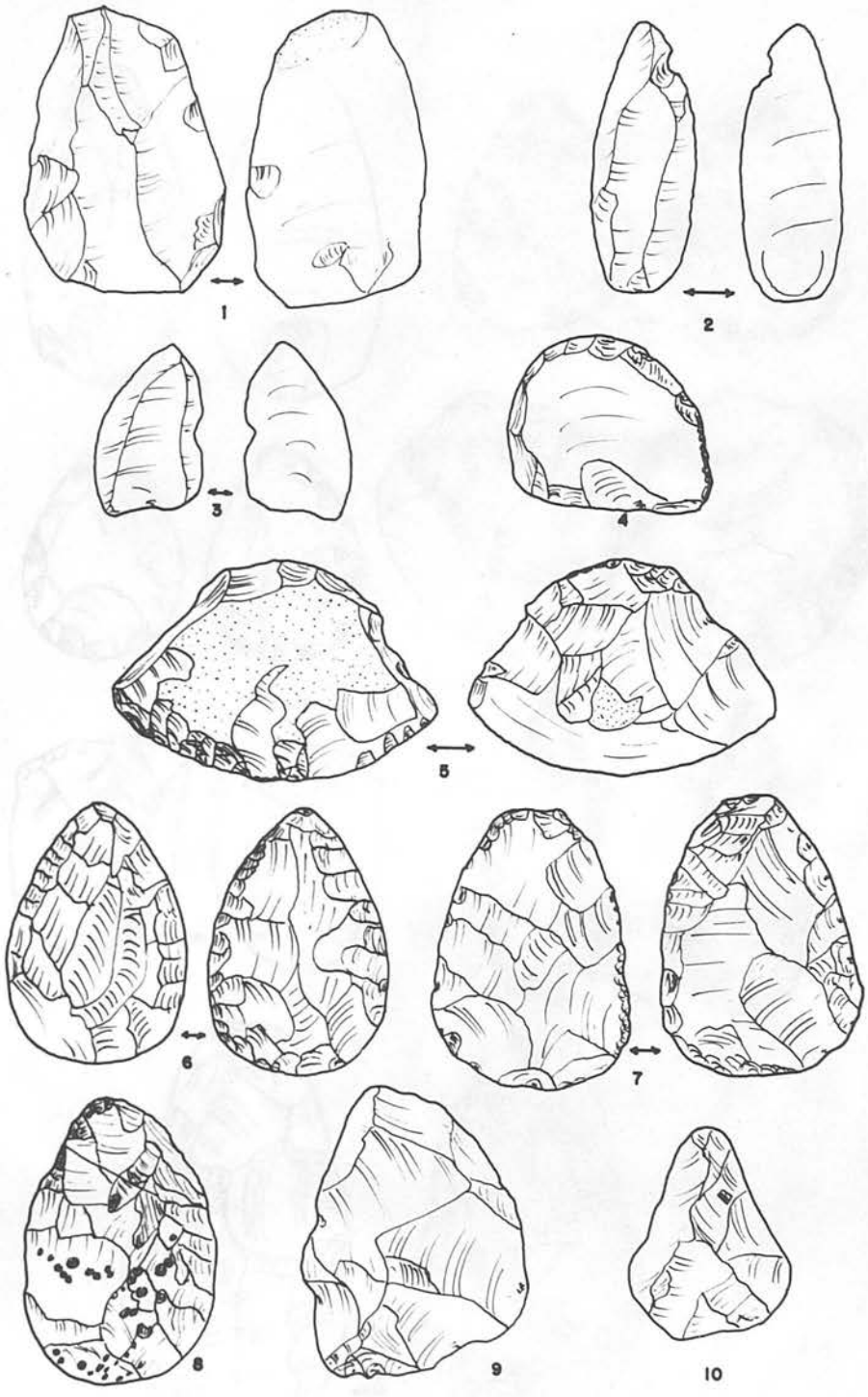


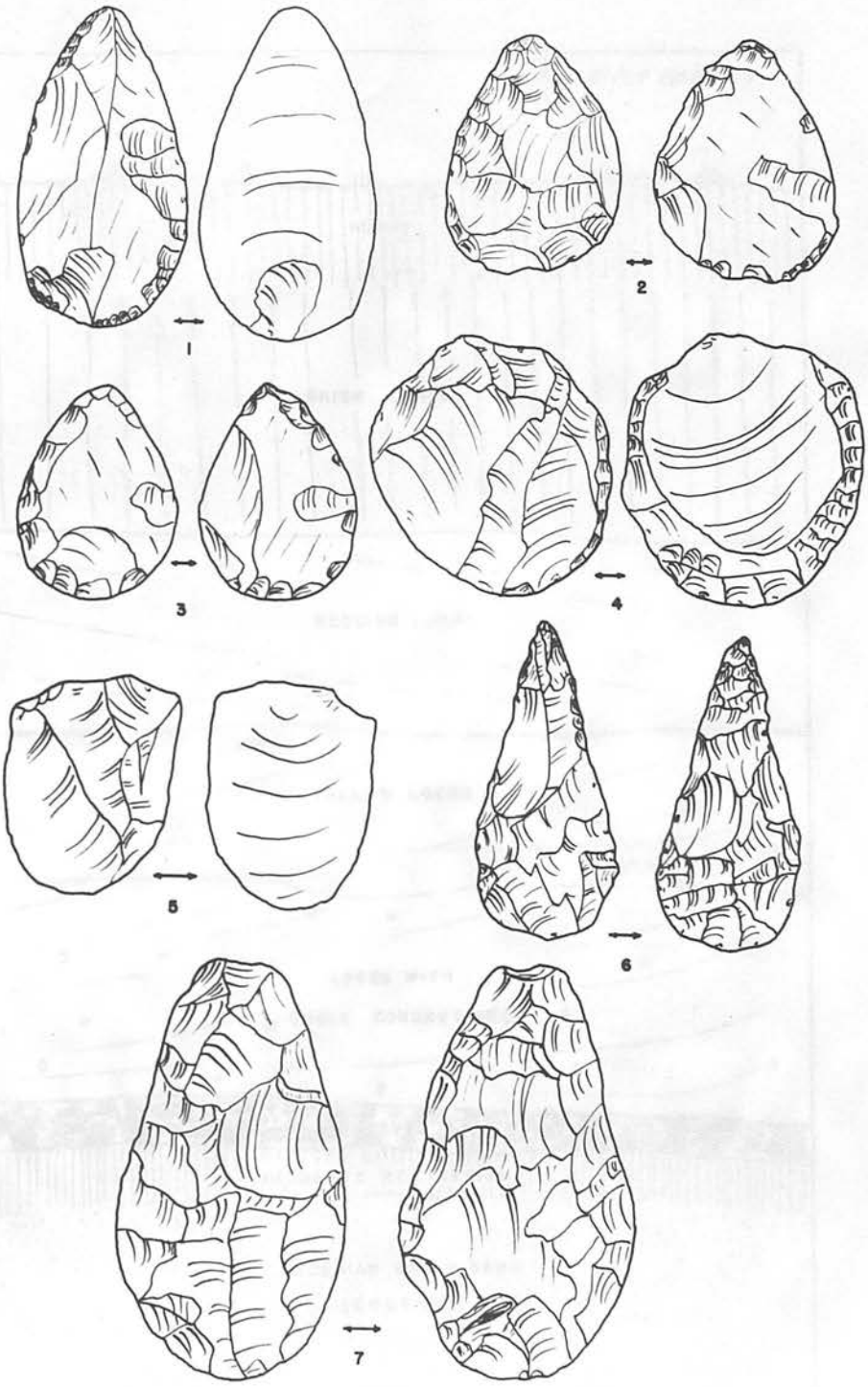
Figure 14

Figure 15



MESVIN - CIPLY

Figure 16



BERNARD & SOLVAY QUARRIES—SPIENNES

Figure 17

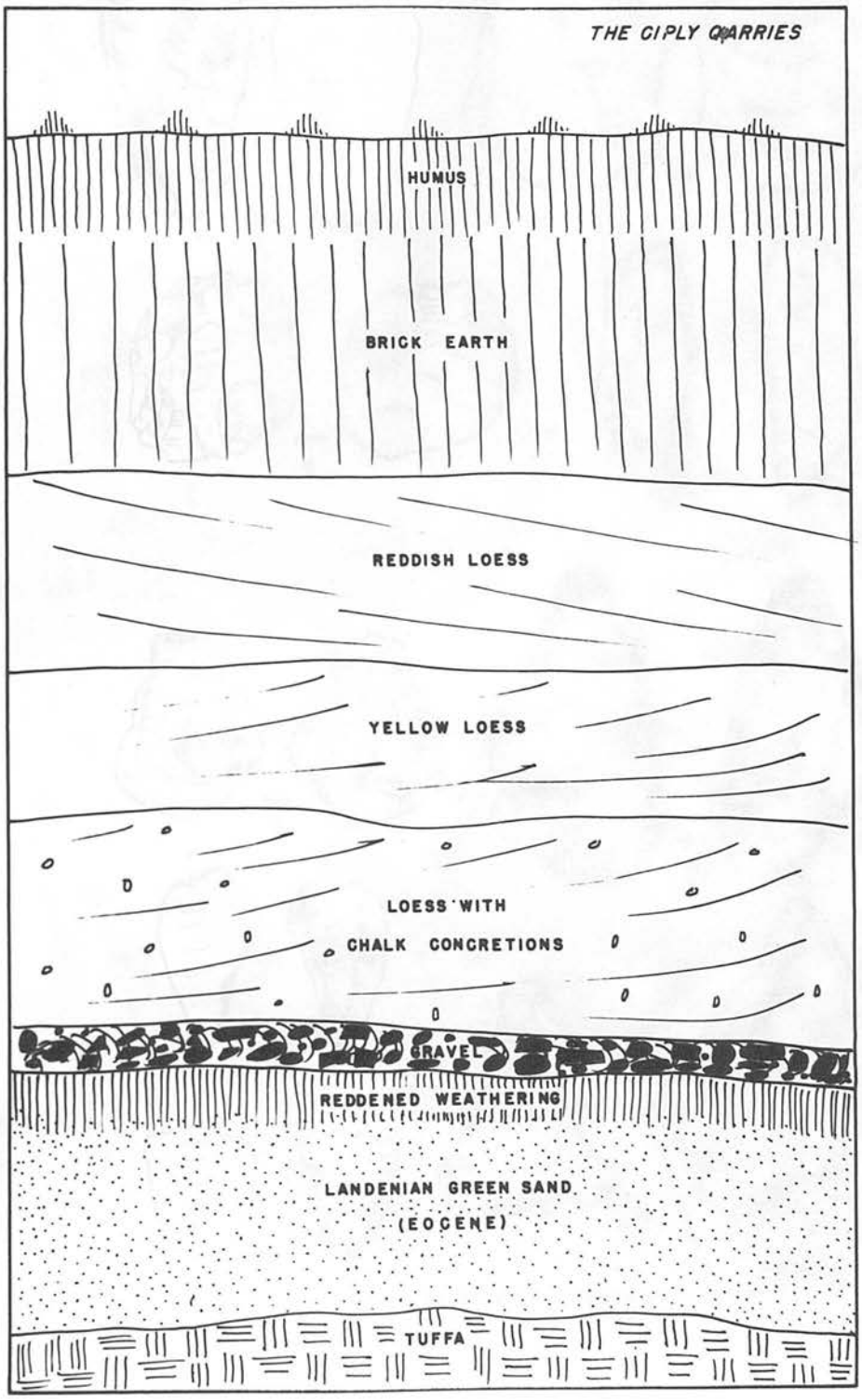
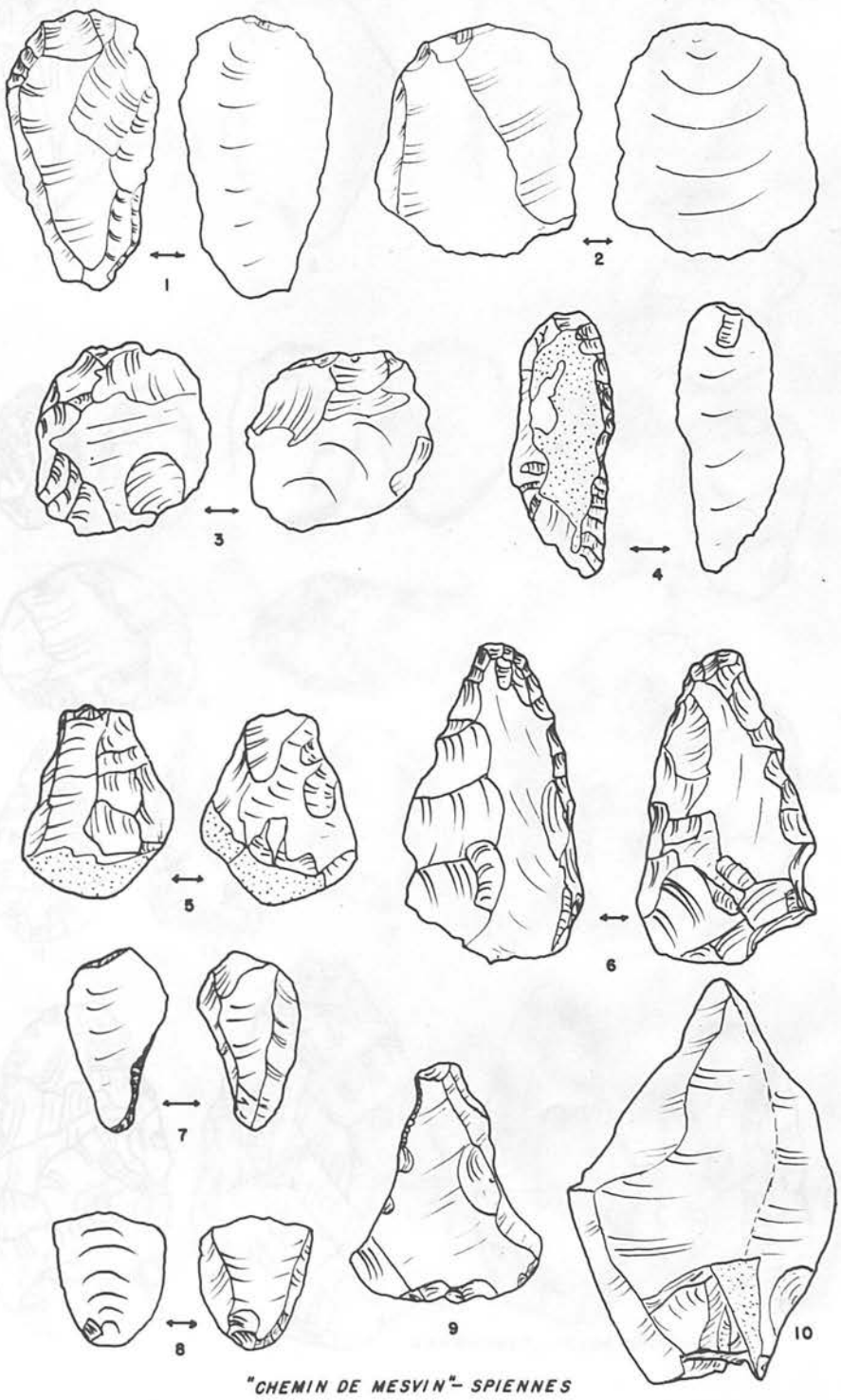
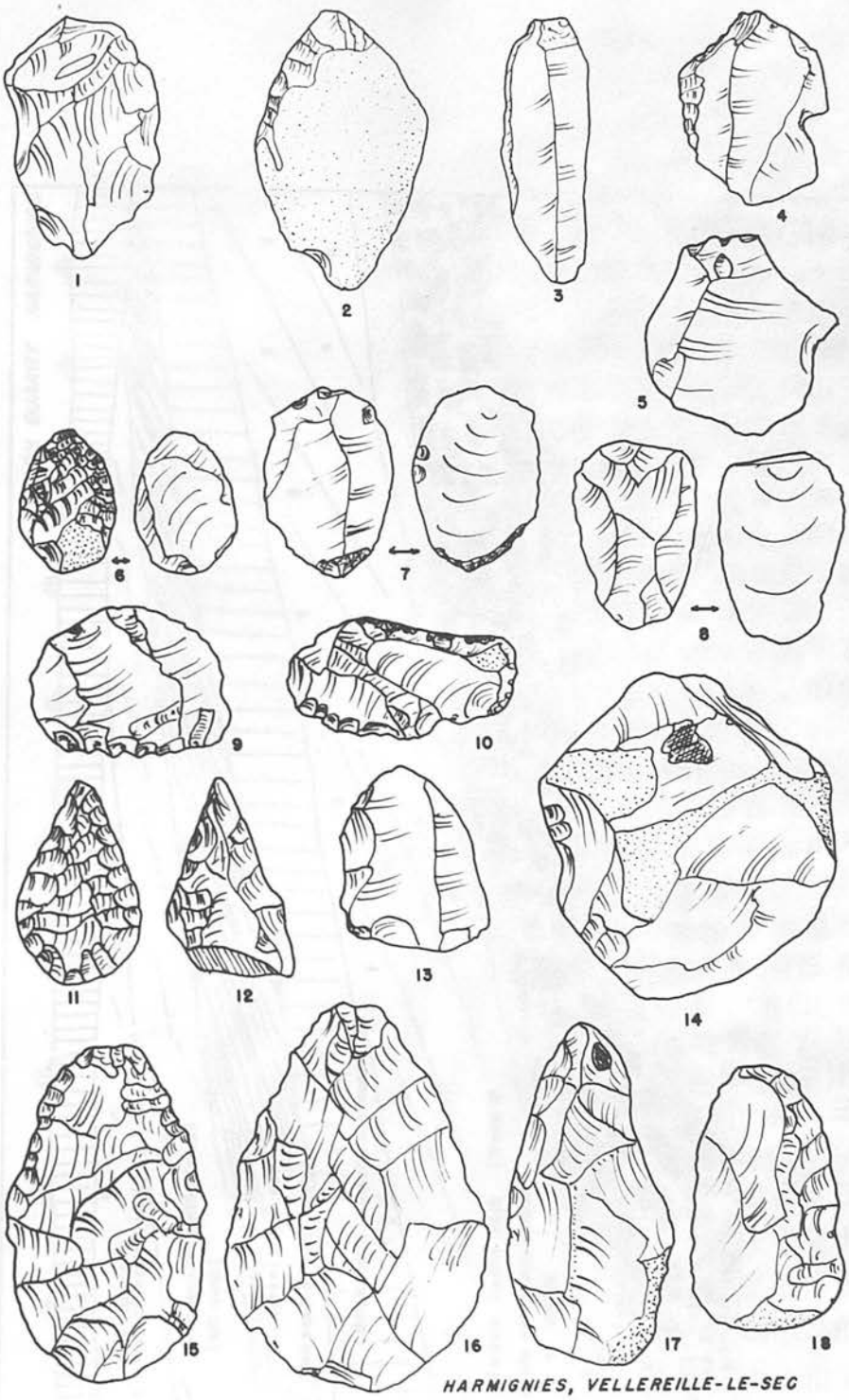

THE CIPLY QUARRIES
HUMUS
BRICK EARTH
REDDISH LOESS
YELLOW LOESS
LOESS WITH
CHALK CONCRETIONS
GRAVEL
REDDENED WEATHERING
LANDENIAN GREEN SAND
(EOCENE)
TUFFA

Figure 18



"CHEMIN DE MESVIN"- SPIENNES

Figure 19


1
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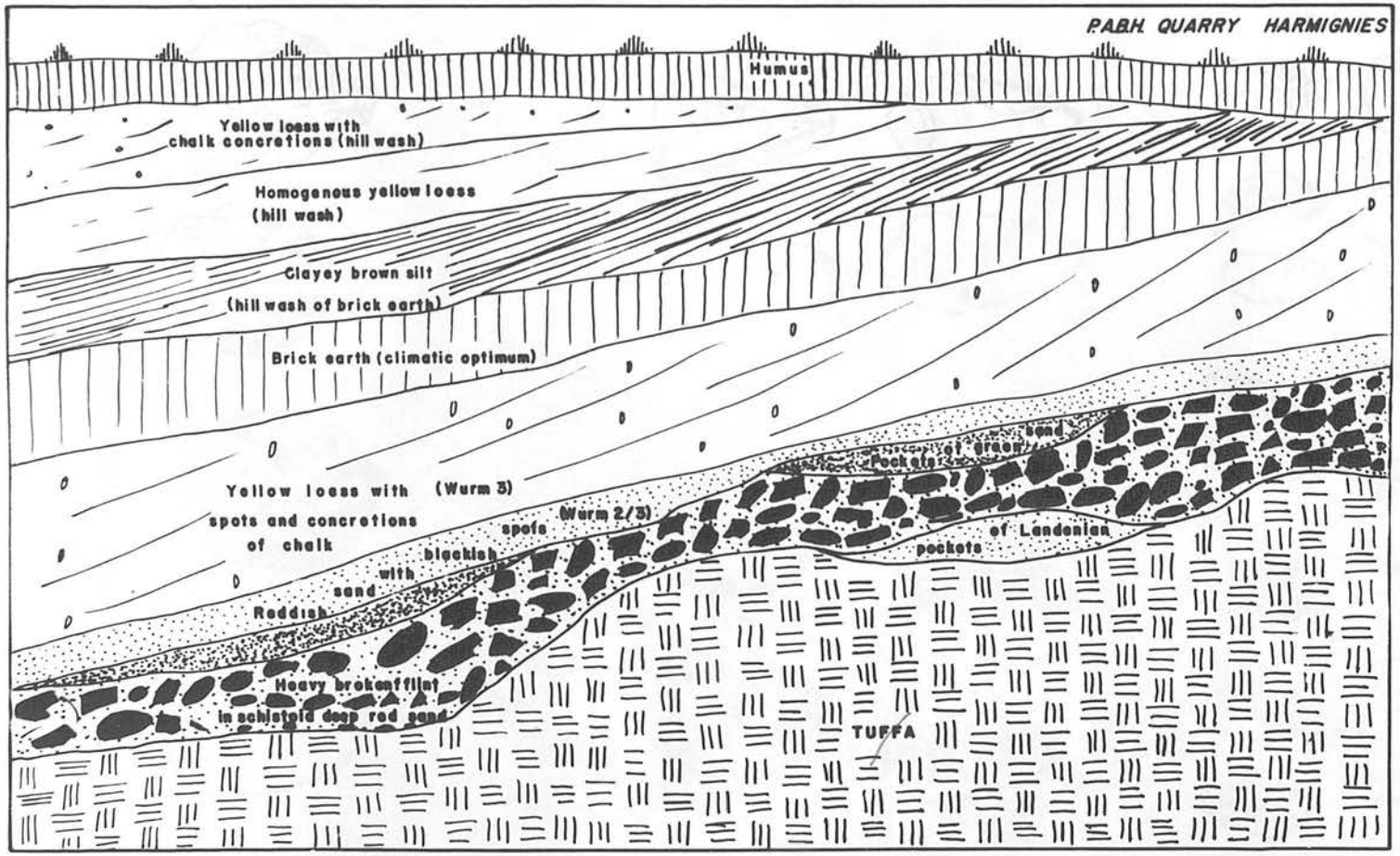
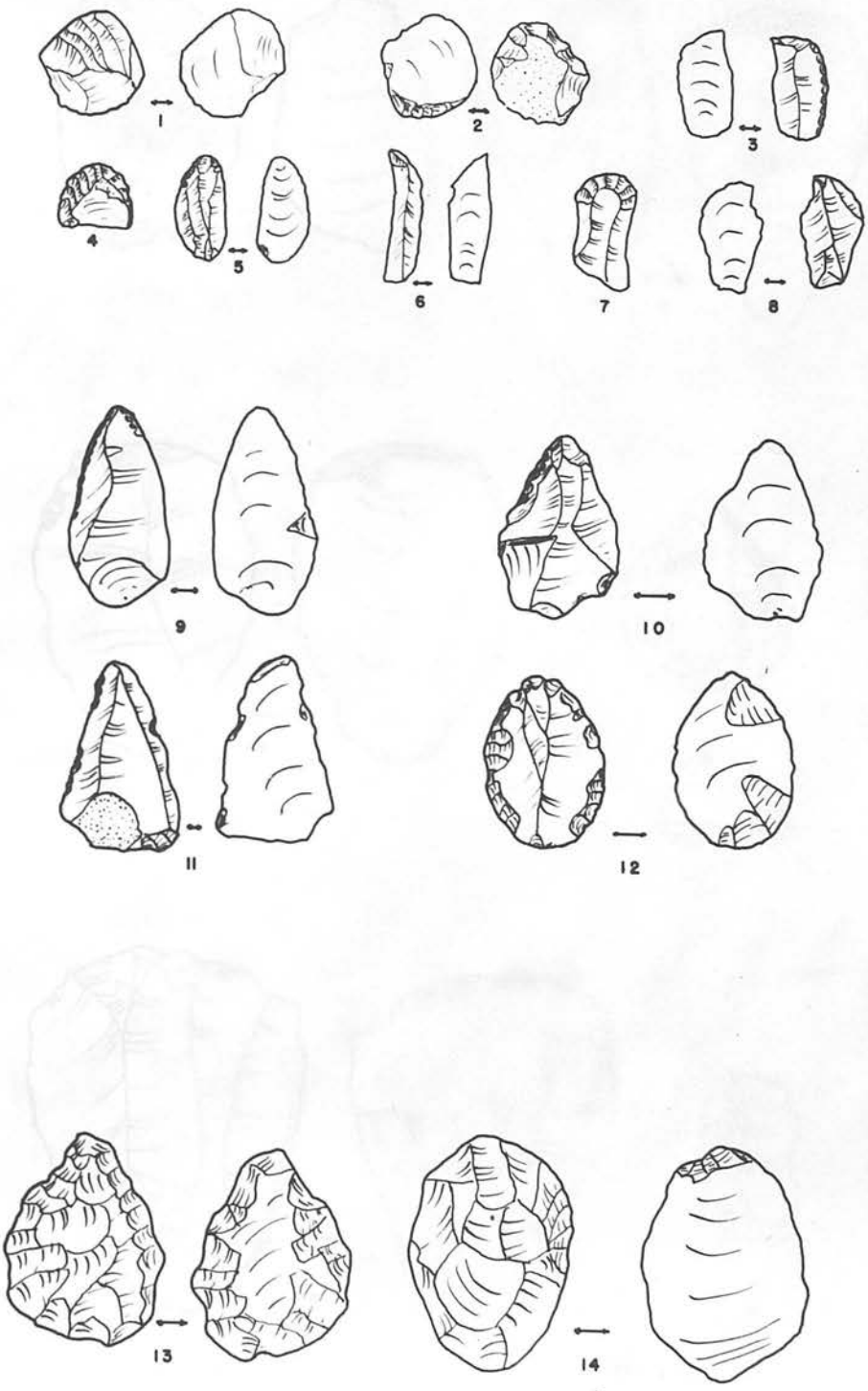
HARMIGNIES, VELLEREILLE-LE-SEC



/TUFA

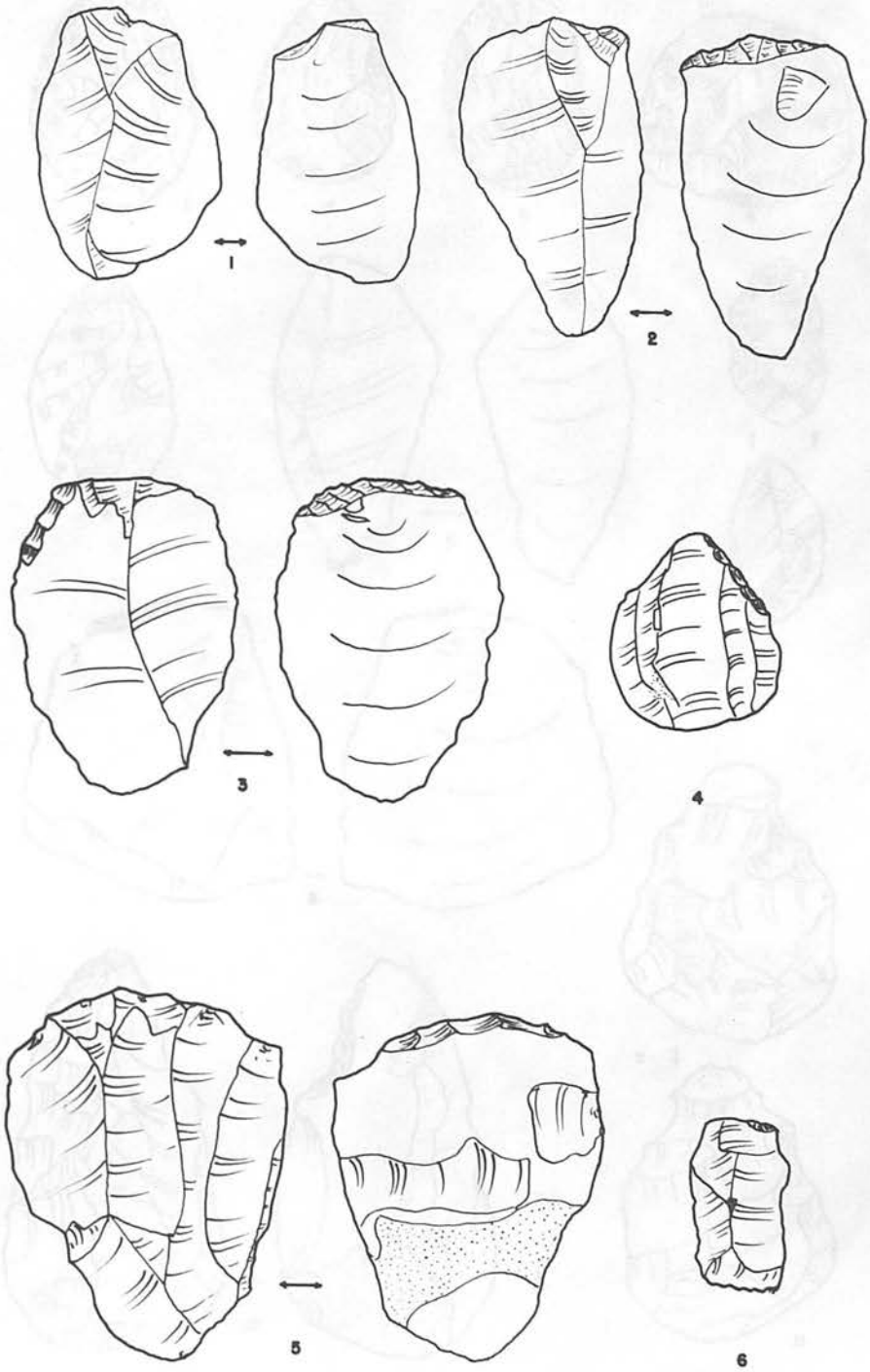
Figure 20

Figure 21



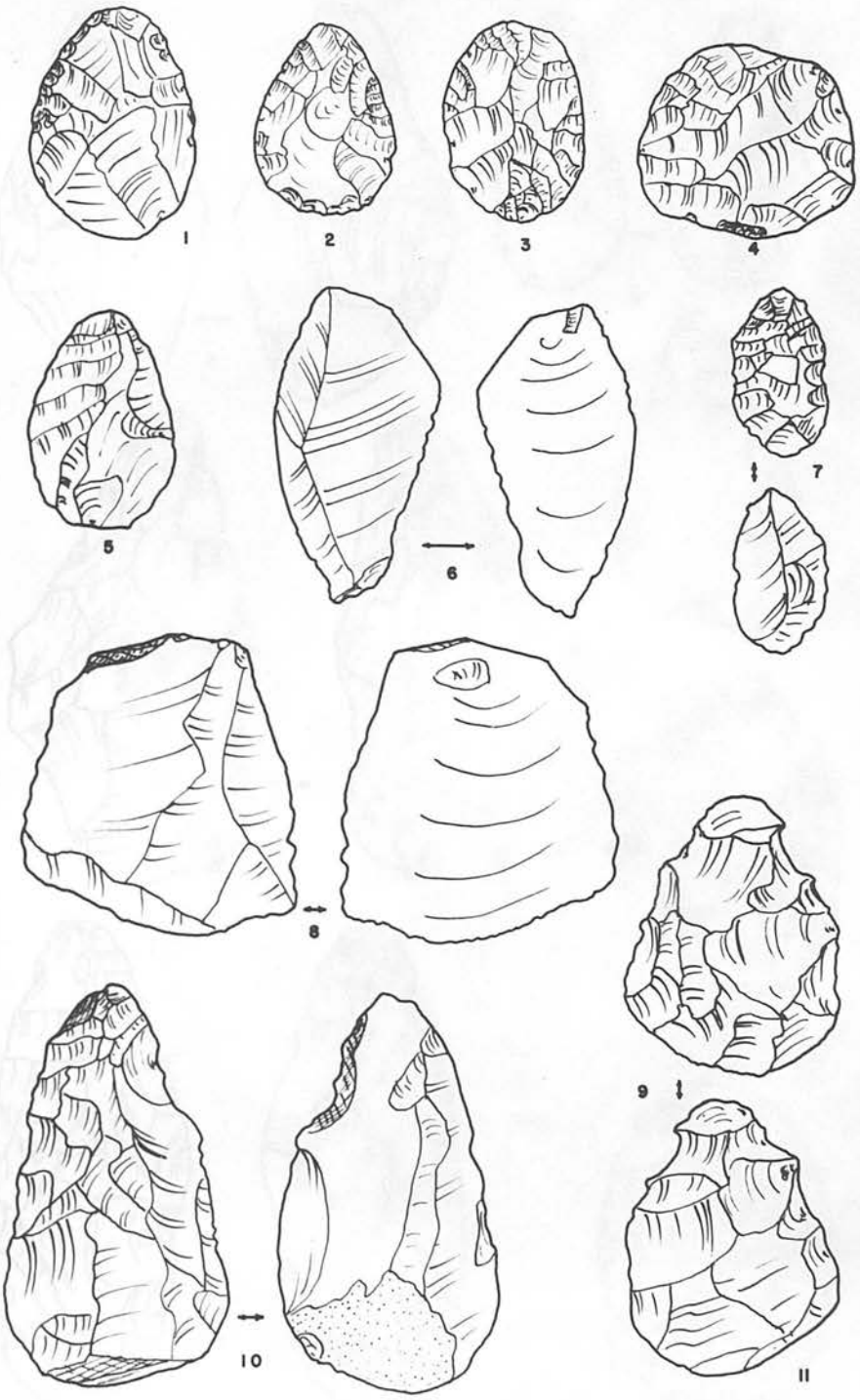
VELLEREILLE LE SEC, ESTINNES, BRAY

Figure 22



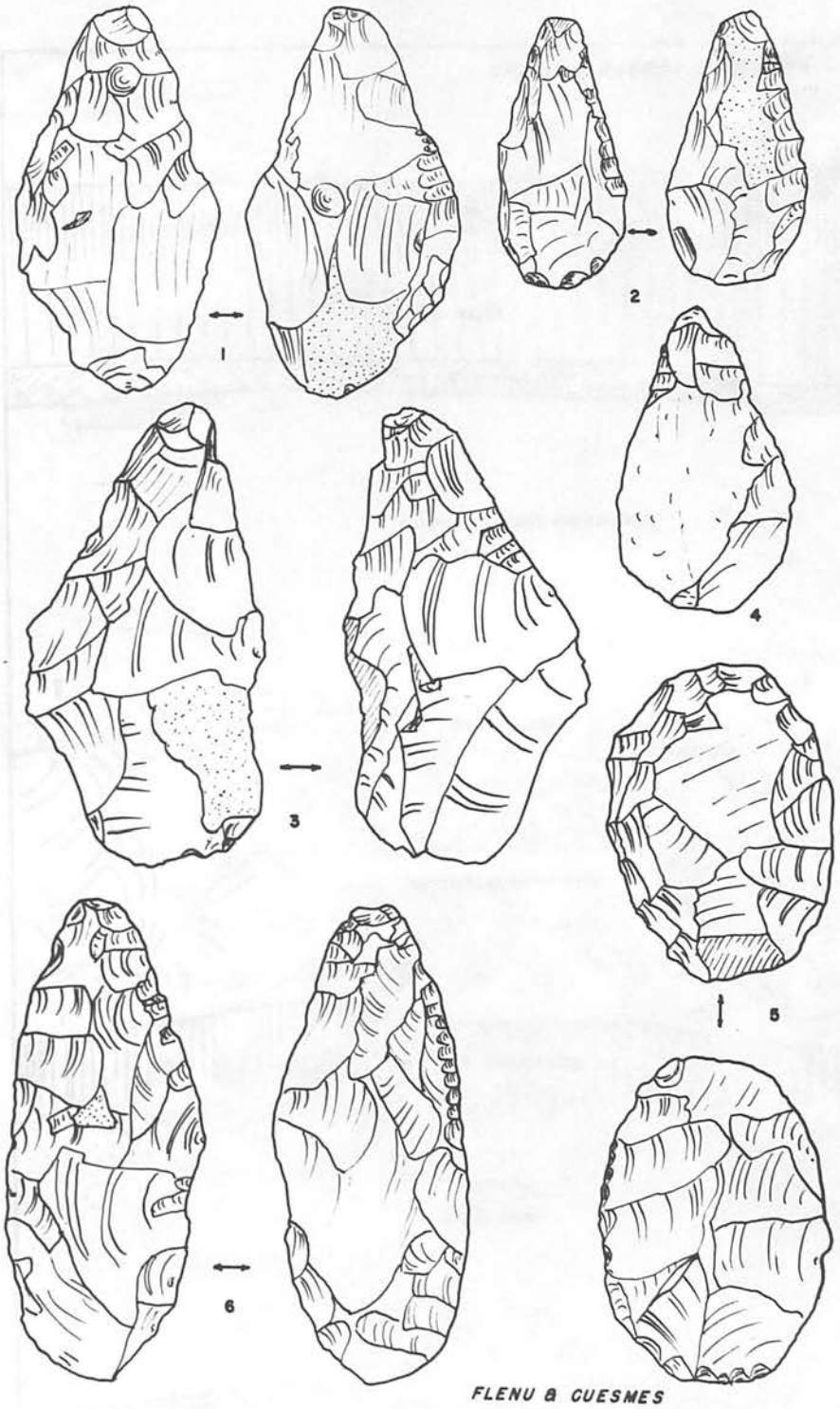
ASQUILLIES

Figure 23



BOIS DE MONS & MT. PANISEL

Figure 24



FLENU B CUESMES

Figure 25

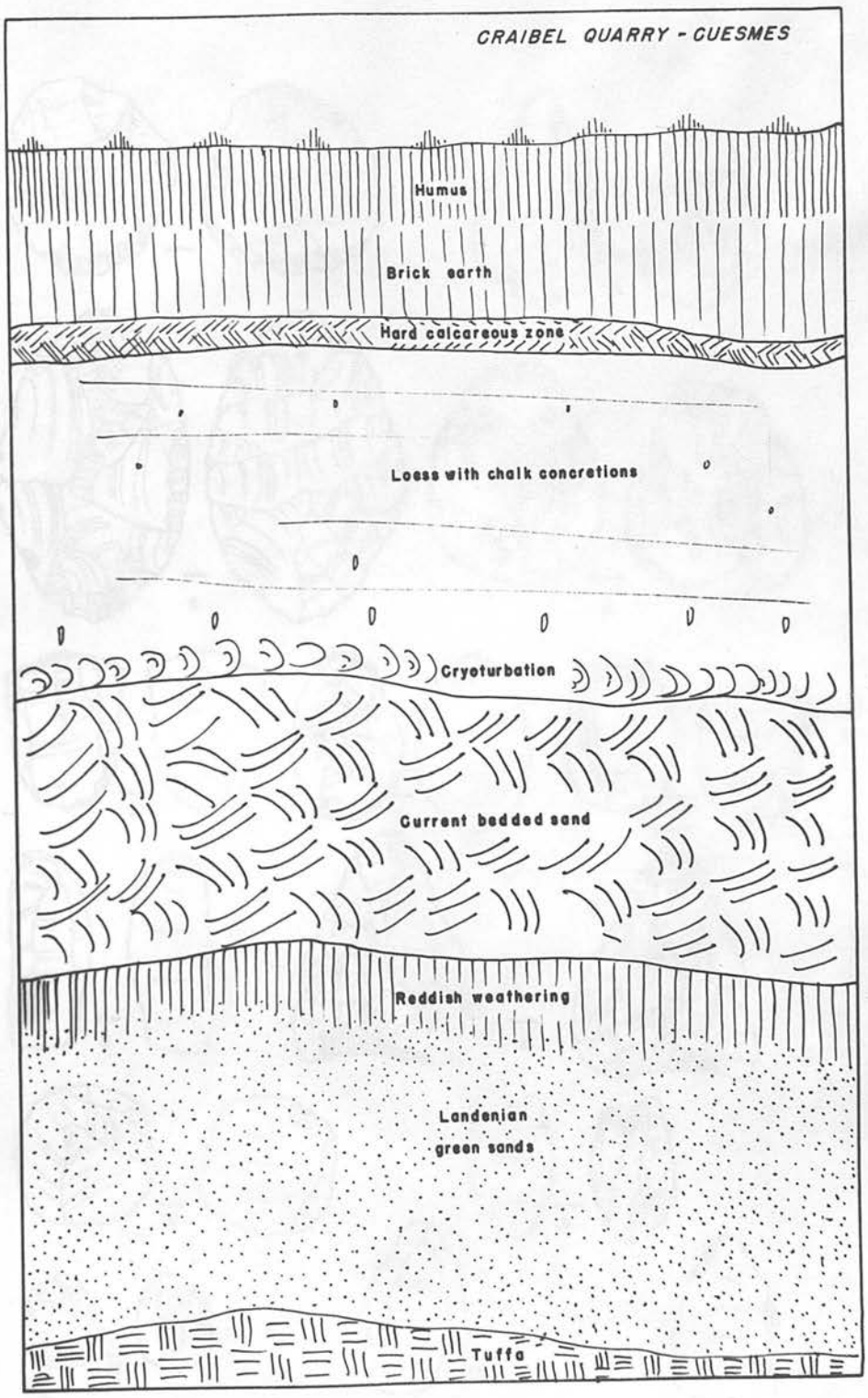
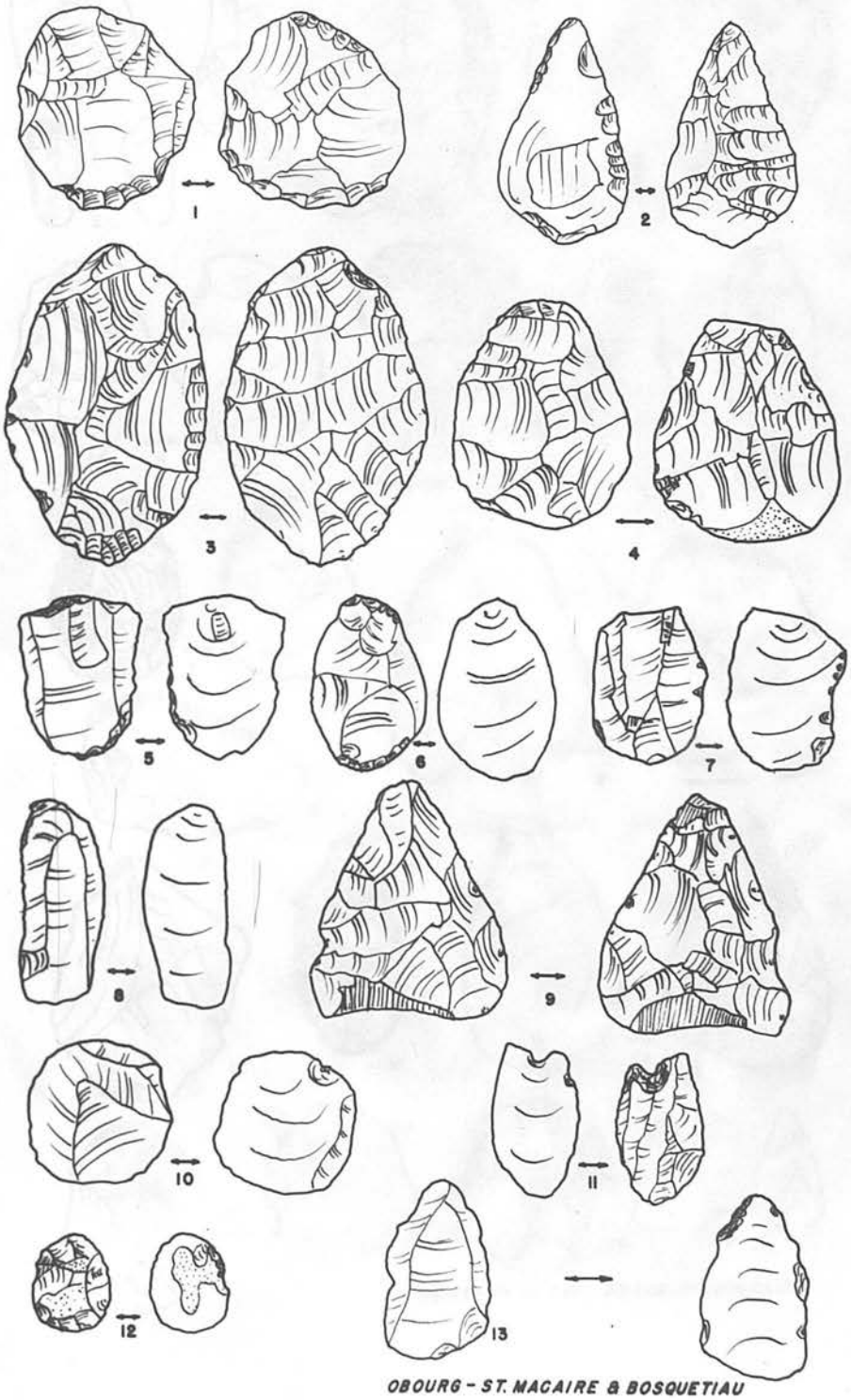

CRAIBEL QUARRY - CUESMES
Humus
Brick earth
Hard calcareous zone
Loess with chalk concretions
Cryoturbation
Current bedded sand
Reddish weathering
Landenian
green sands
Tuffa

Figure 26



OBOURG - ST. MACAIRE & BOSQUETIAU

Figure 27

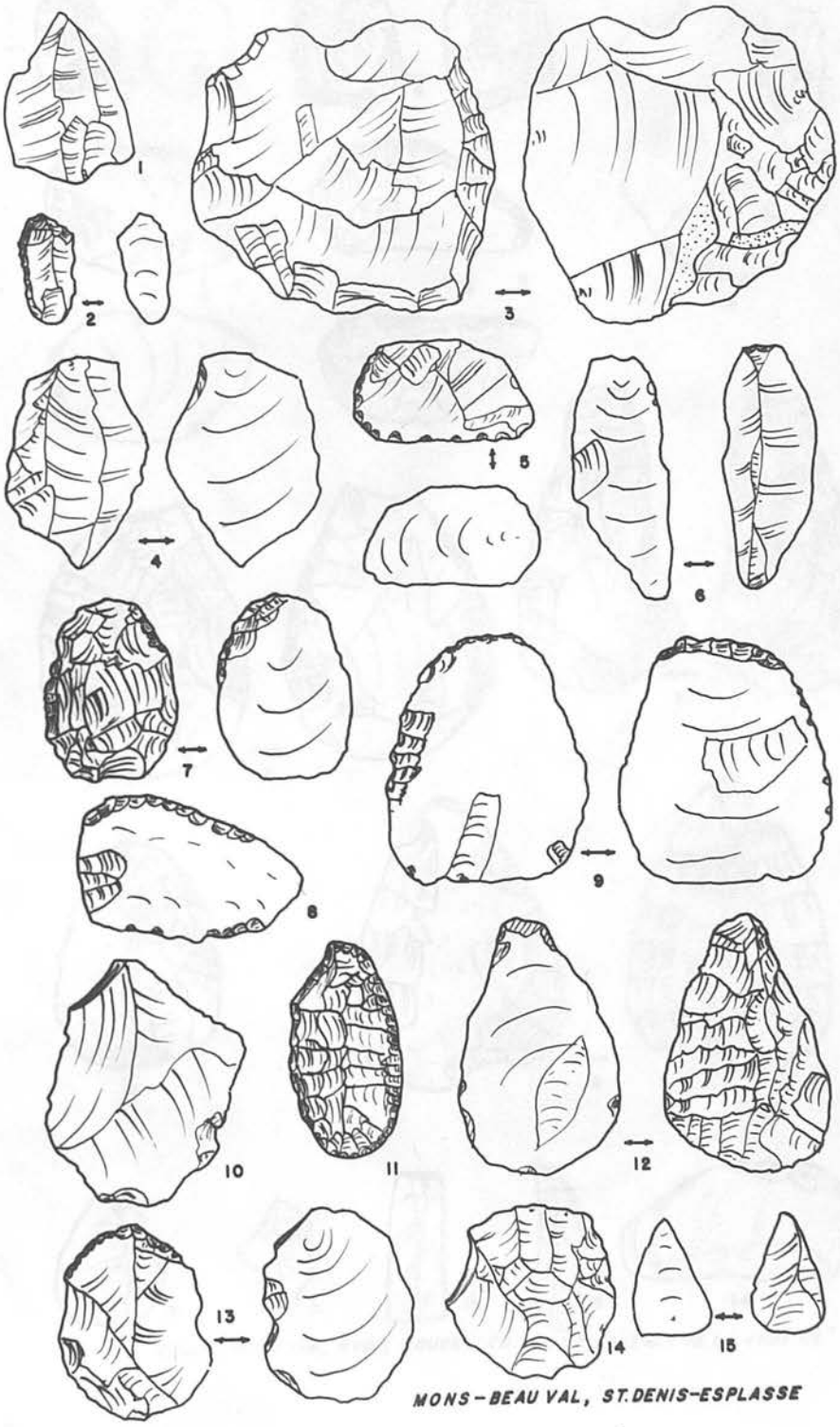
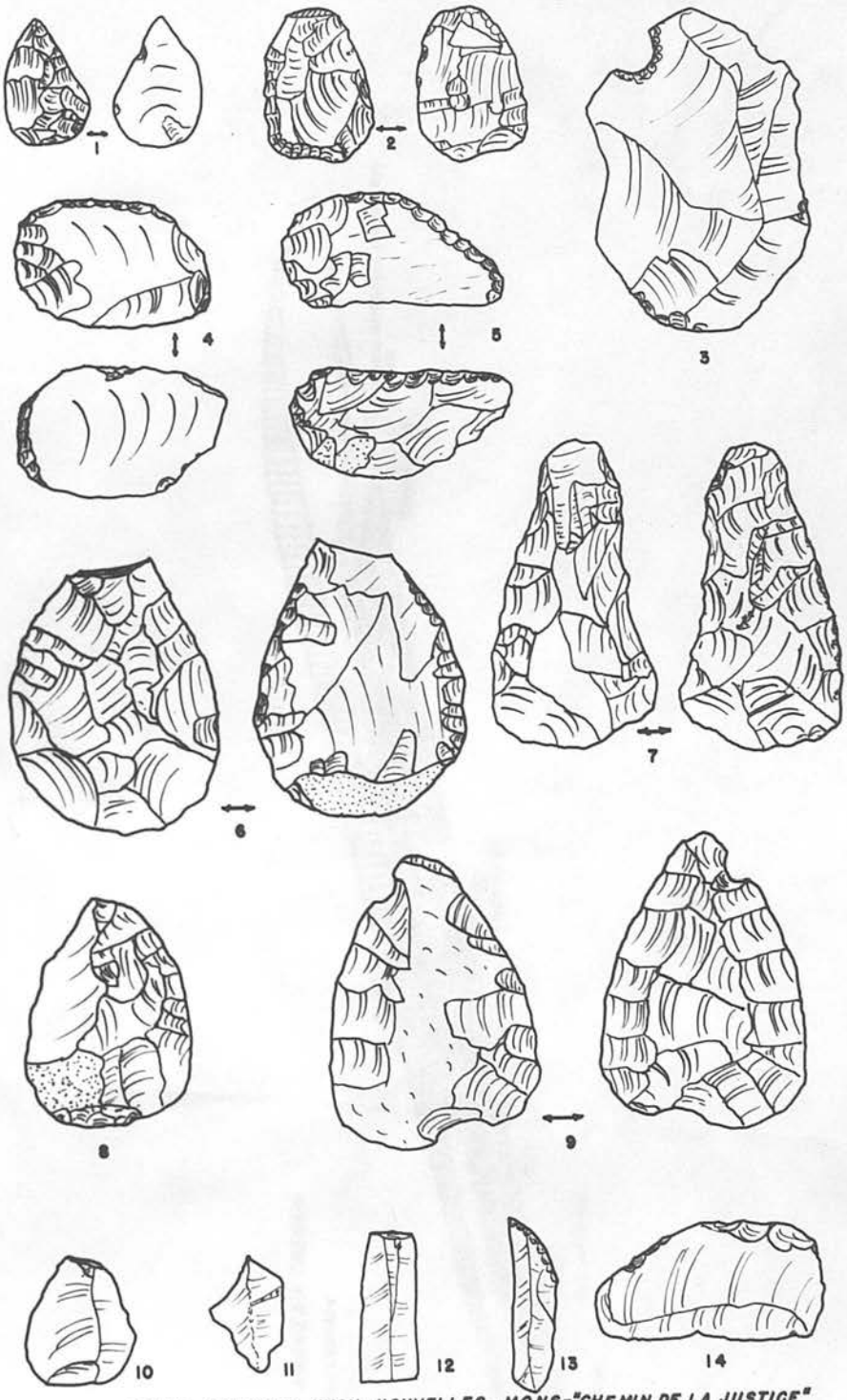


Figure 28

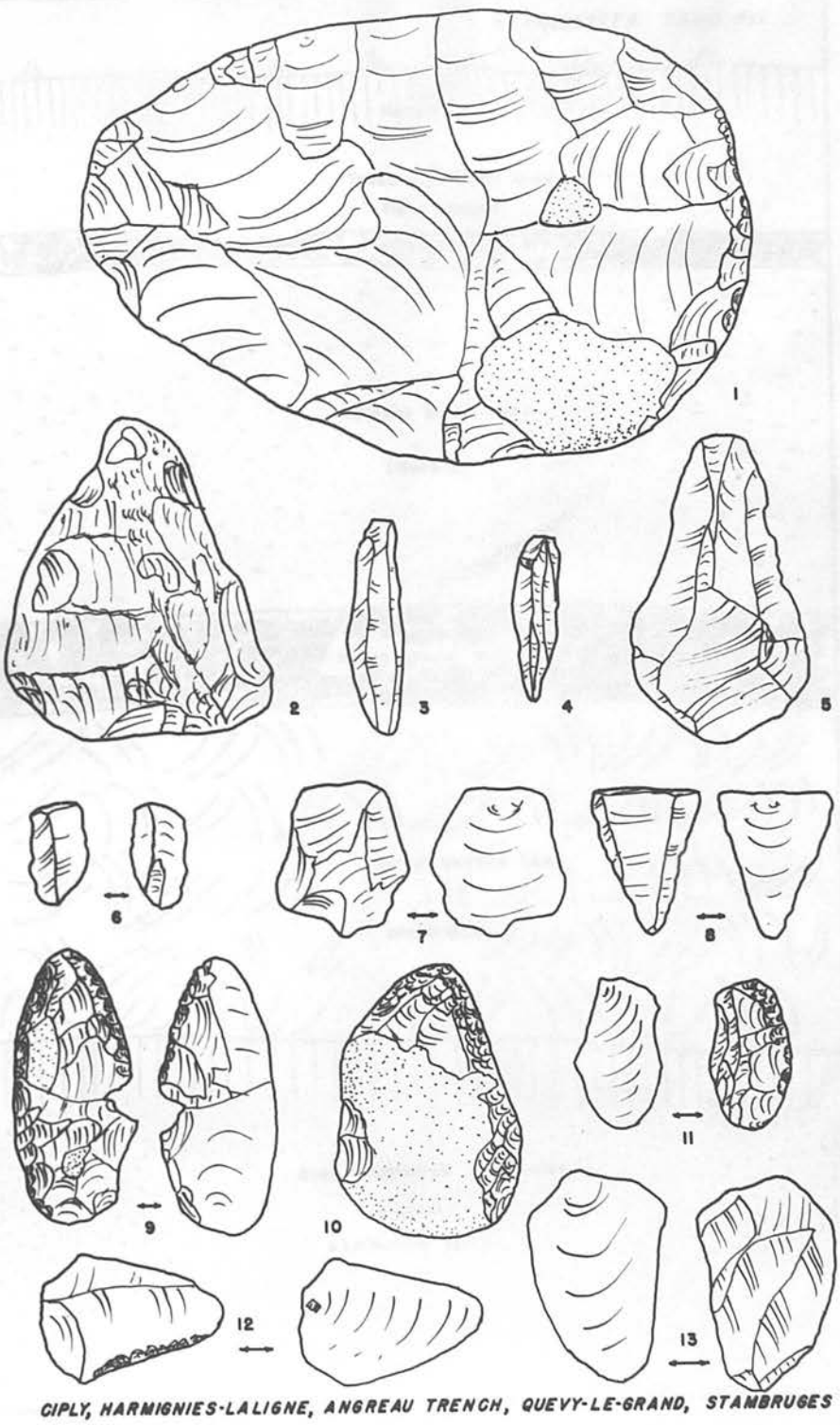


GHLIN, BAUDOUR, HYON, NOUVELLES, MONS-"CHEMIN DE LA JUSTICE"

Figure 29

THE ANGREAU TRENCH
after Ladrière
S
N
Fine Loess with black concretions
Black Peaty Silt
Clayey sand
Coarse sand
Brick Earth
Tufta (Phadoloma)
Flaky Clay
Chalk
Prêle
Flint Conglomerate
Yellow Loess
Limon Fendillé'
Gravel
Gray Loess

Figure 30



CIPLY, HARMIGNIES-LALIGNE, ANGREAU TRENCH, QUEVY-LE-GRAND, STAMBRUGES

Figure 31

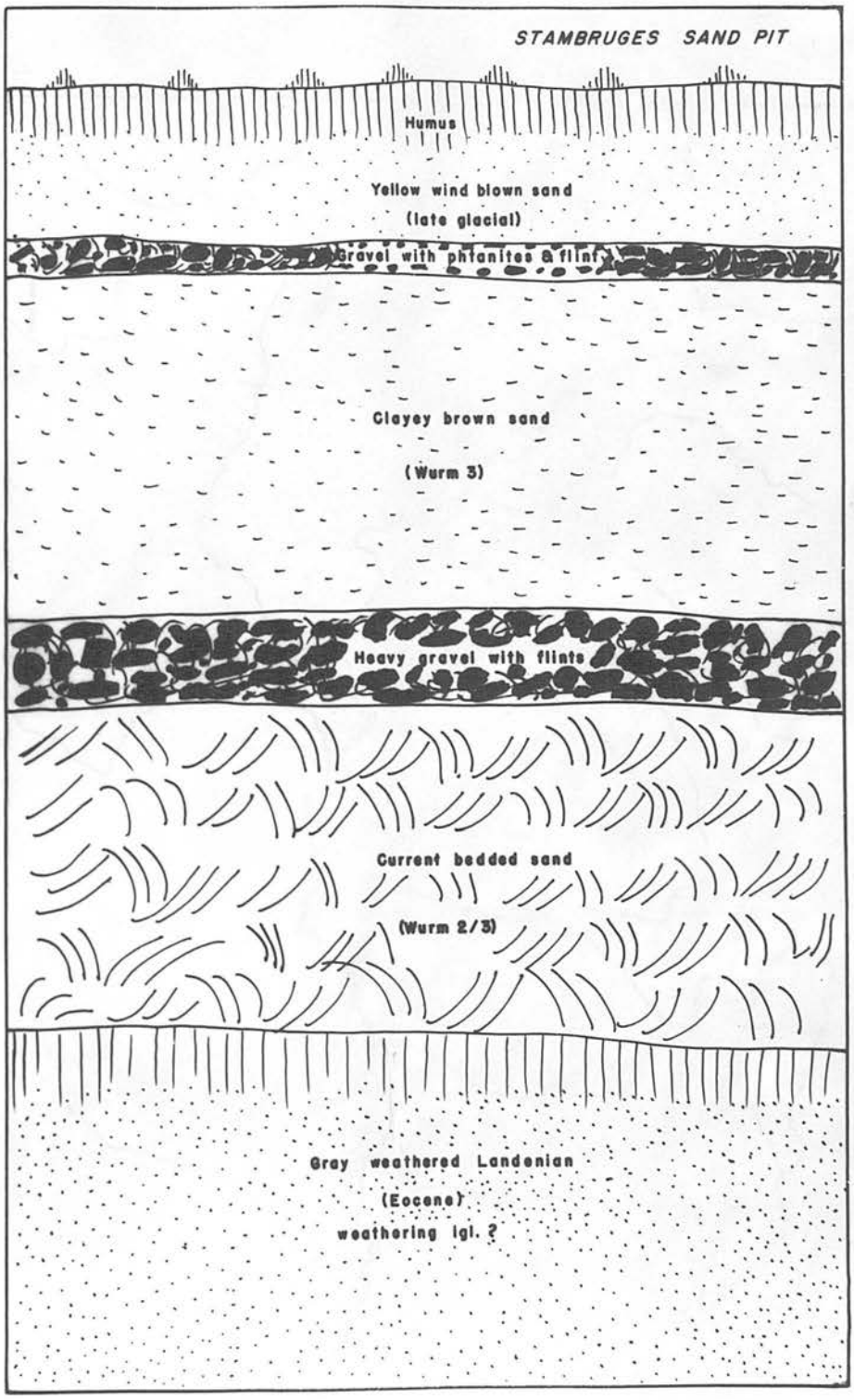

STAMBRUGES SAND PIT
Humus
Yellow wind blown sand
(late glacial)
Gravel with phtanites & flint
Clayey brown sand
(Wurm 3)
Heavy gravel with flints
Current bedded sand
(Wurm 2/3)
Gray weathered Landenian
(Eocene)
weathering ig. ?

Figure 32

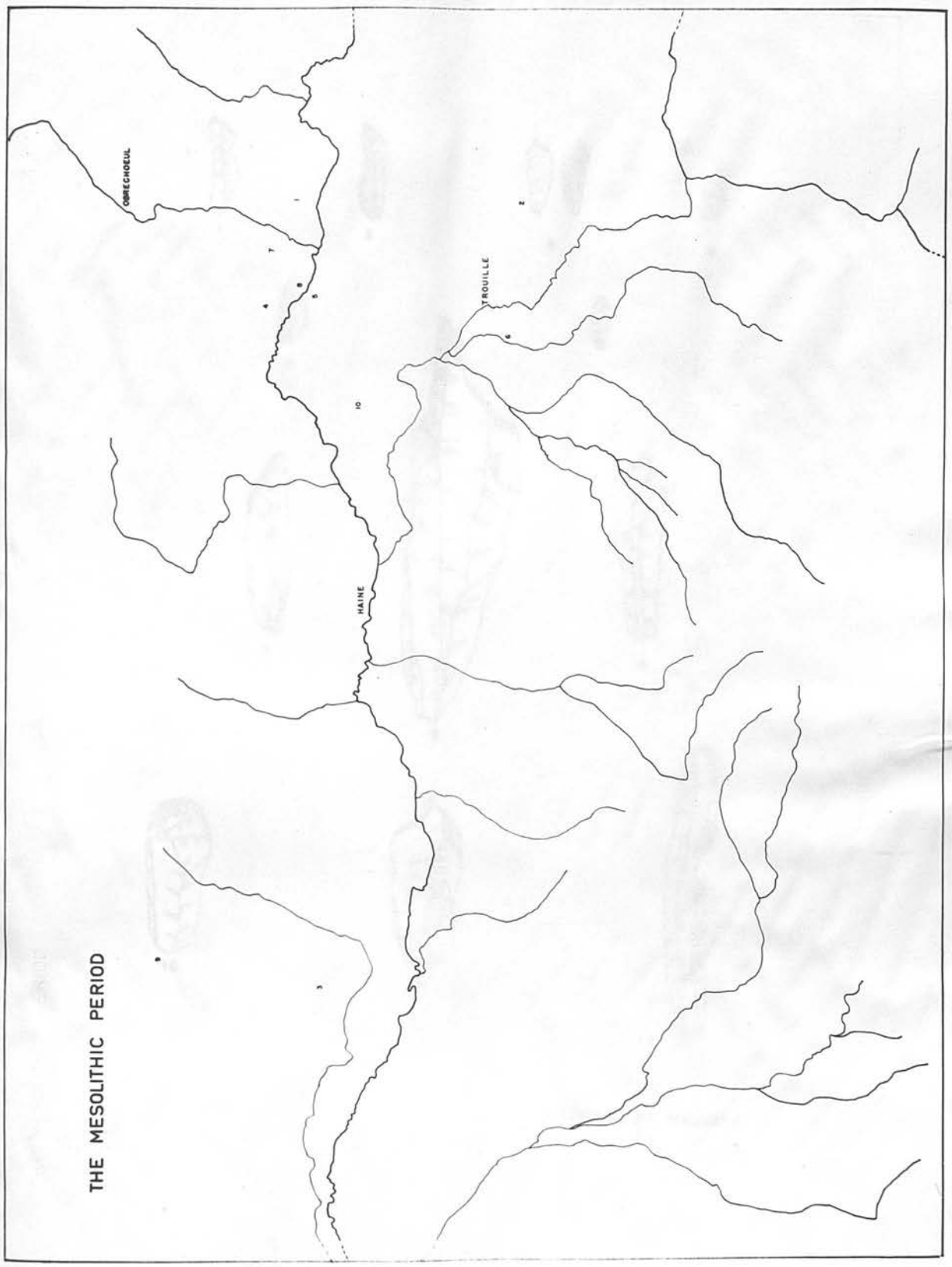
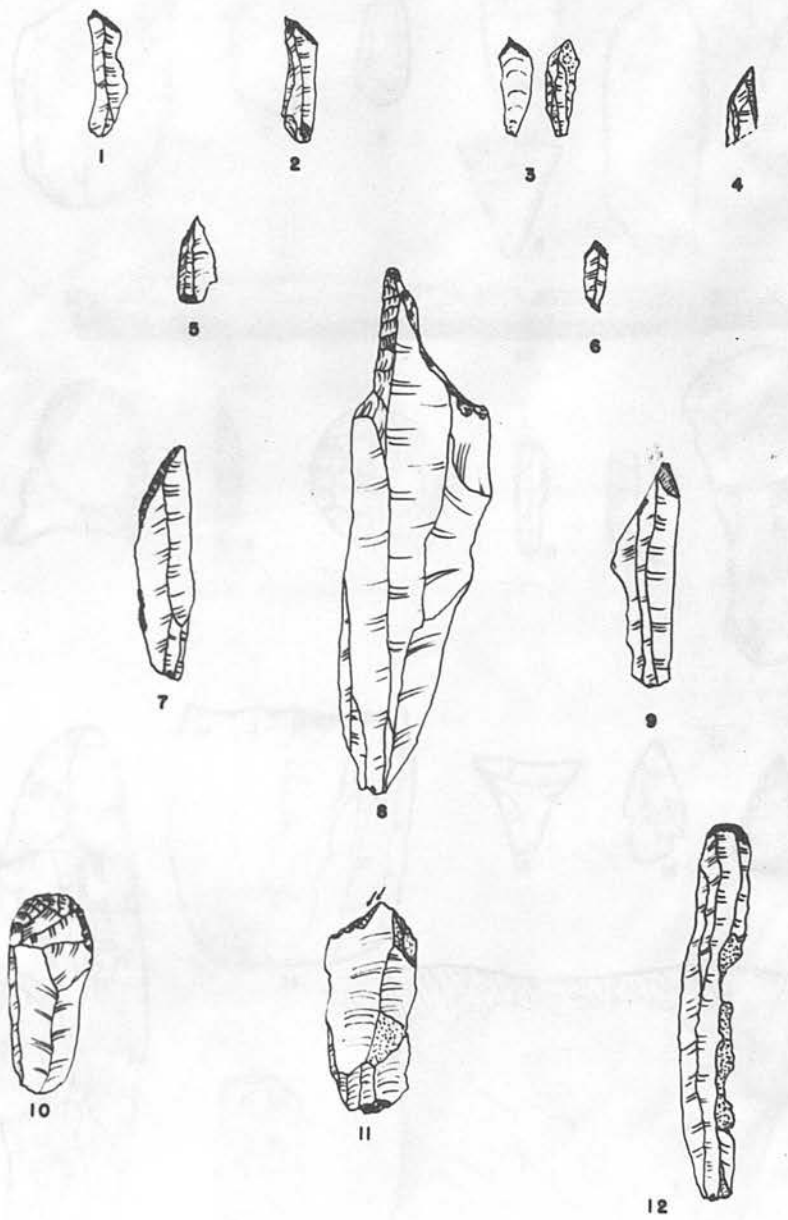


Figure 33



OBOURG ST. MACAIRE

Figure 34

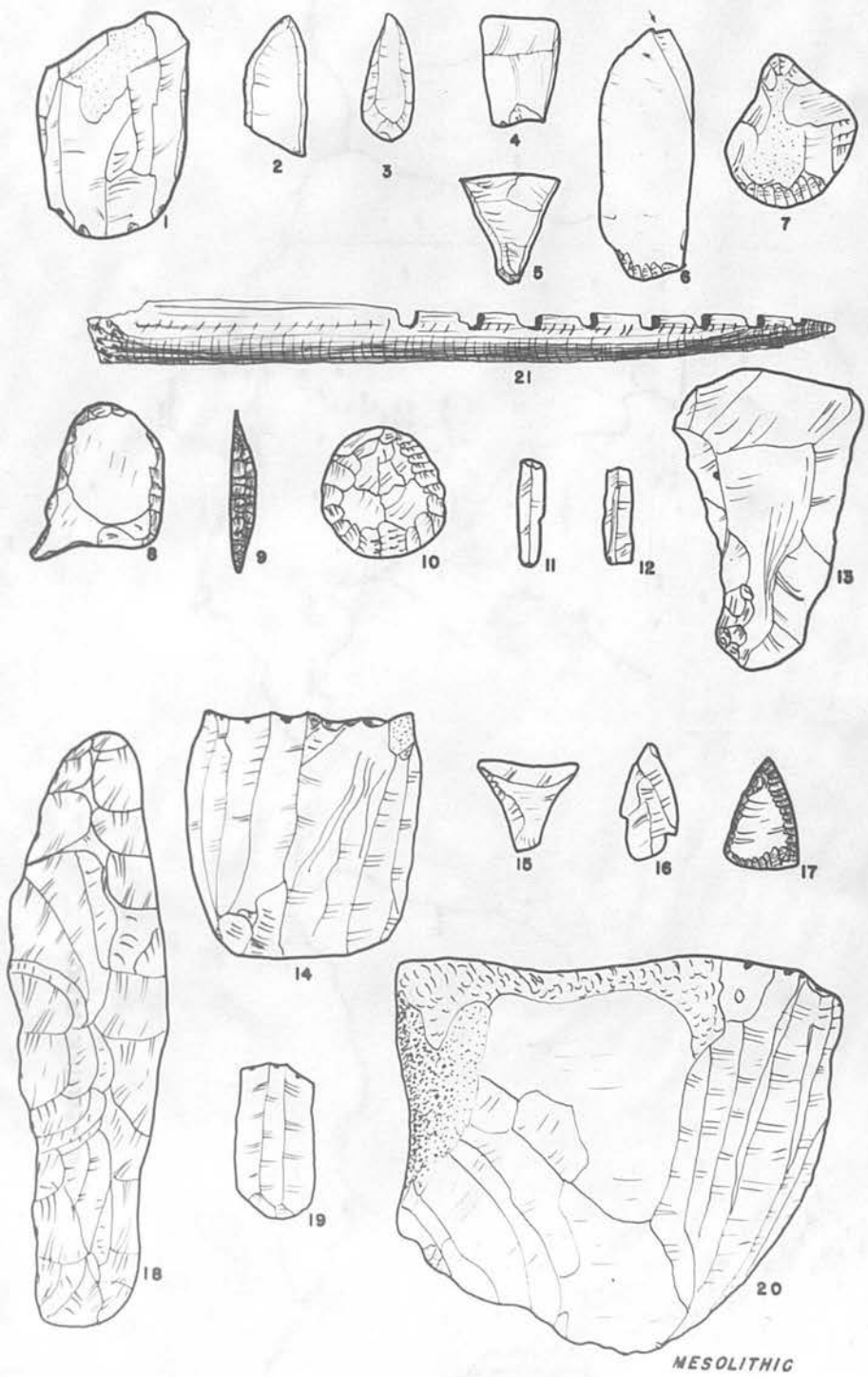
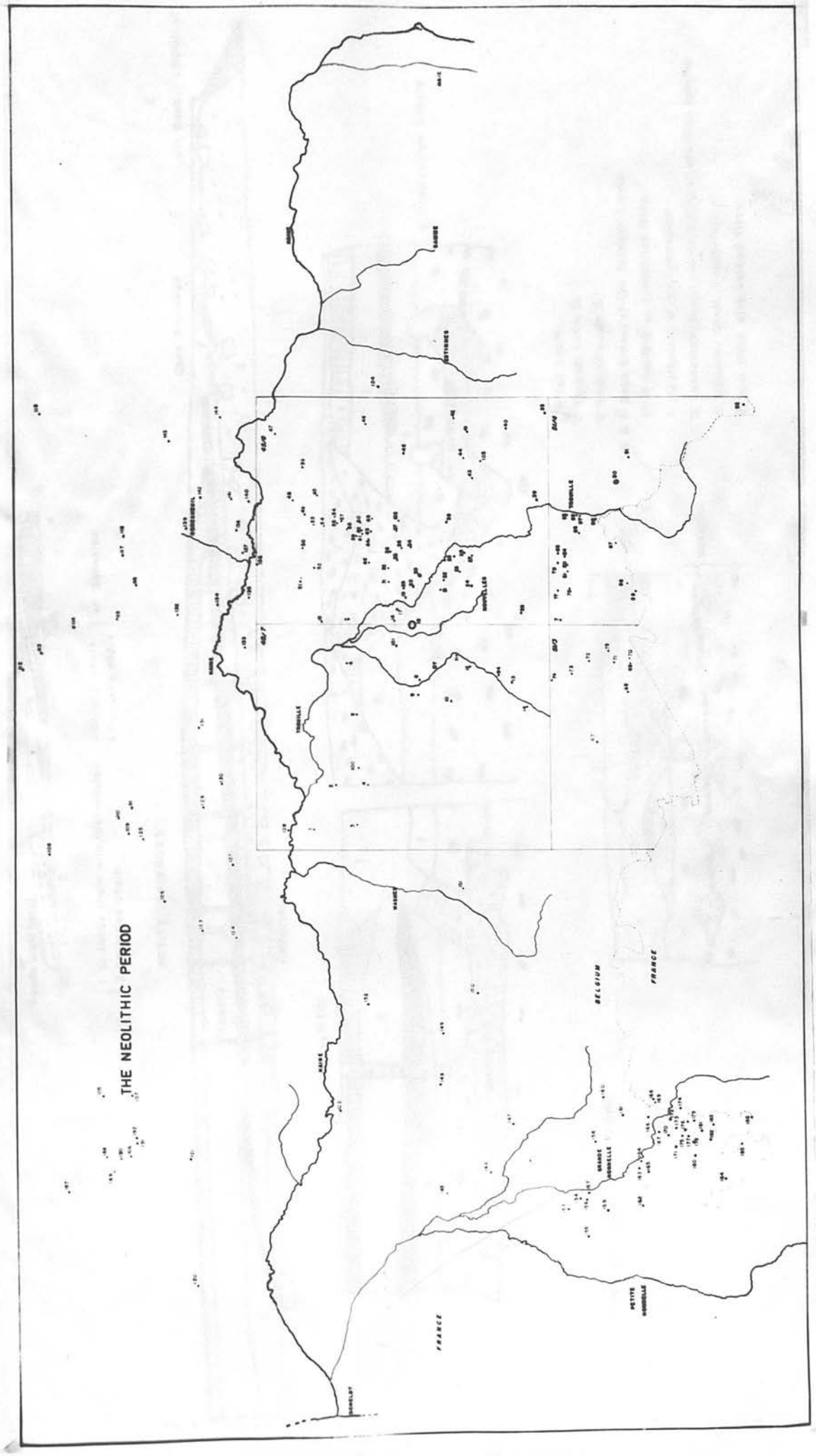
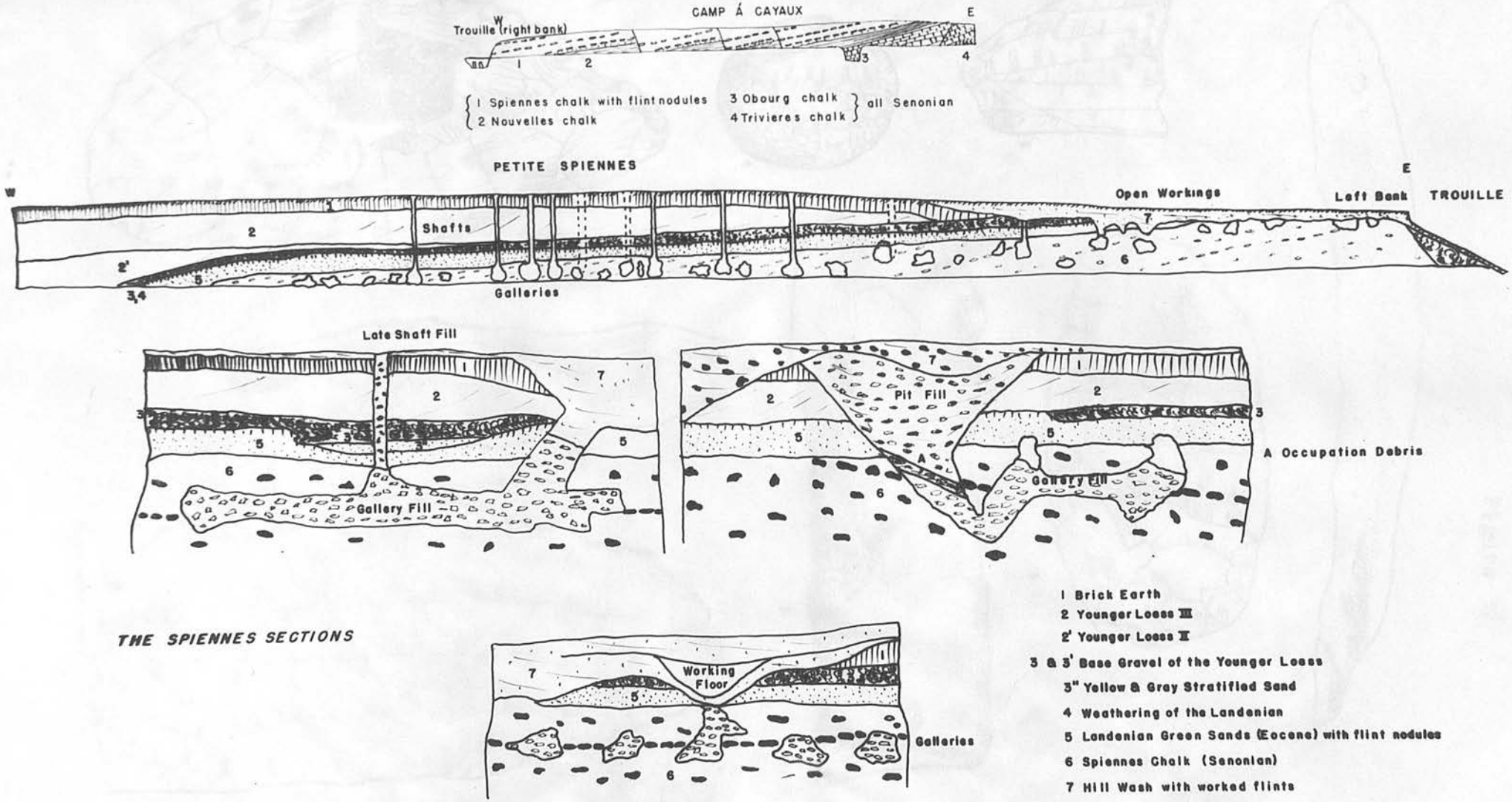


Figure 35

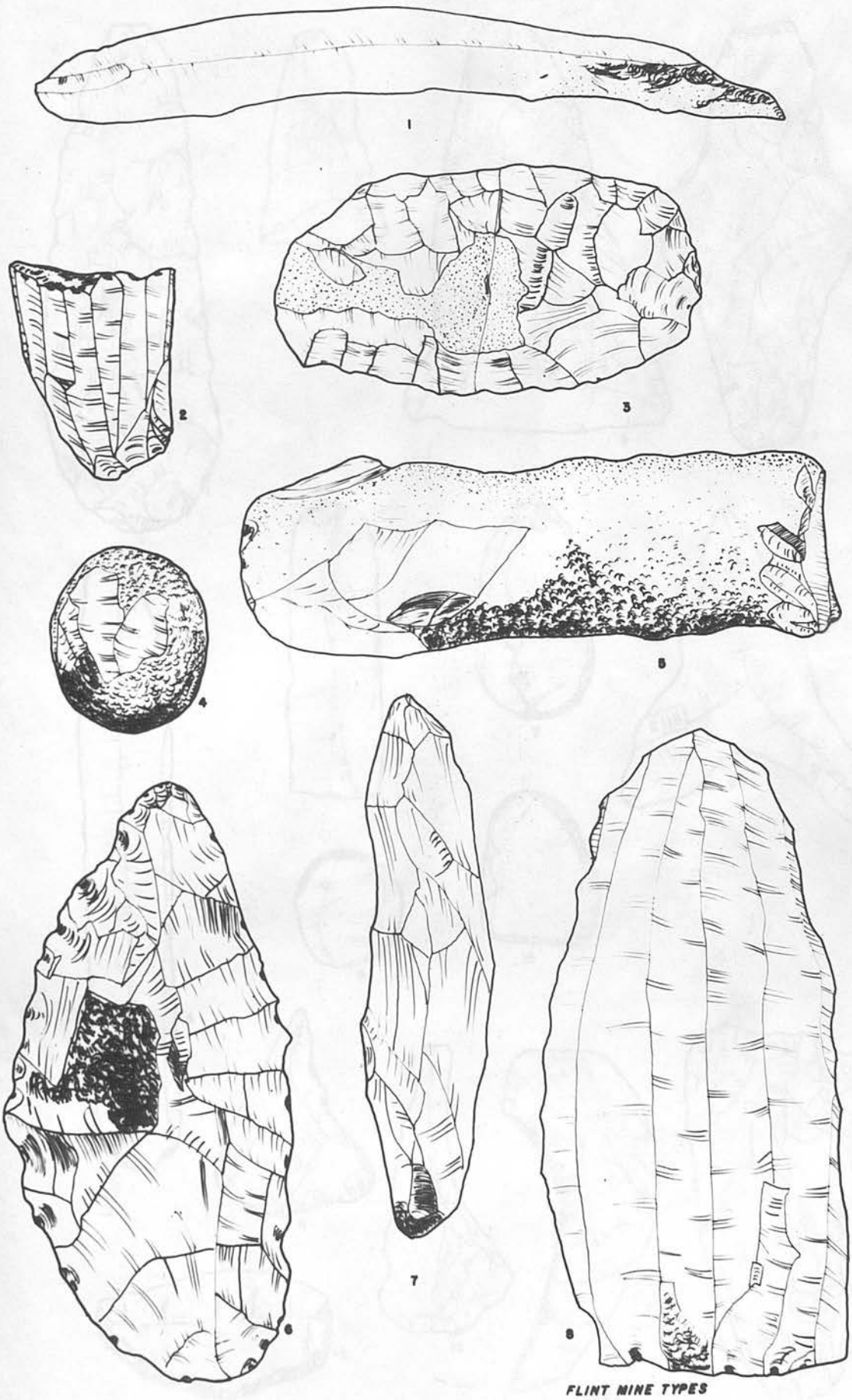




THE SPIENNES SECTIONS

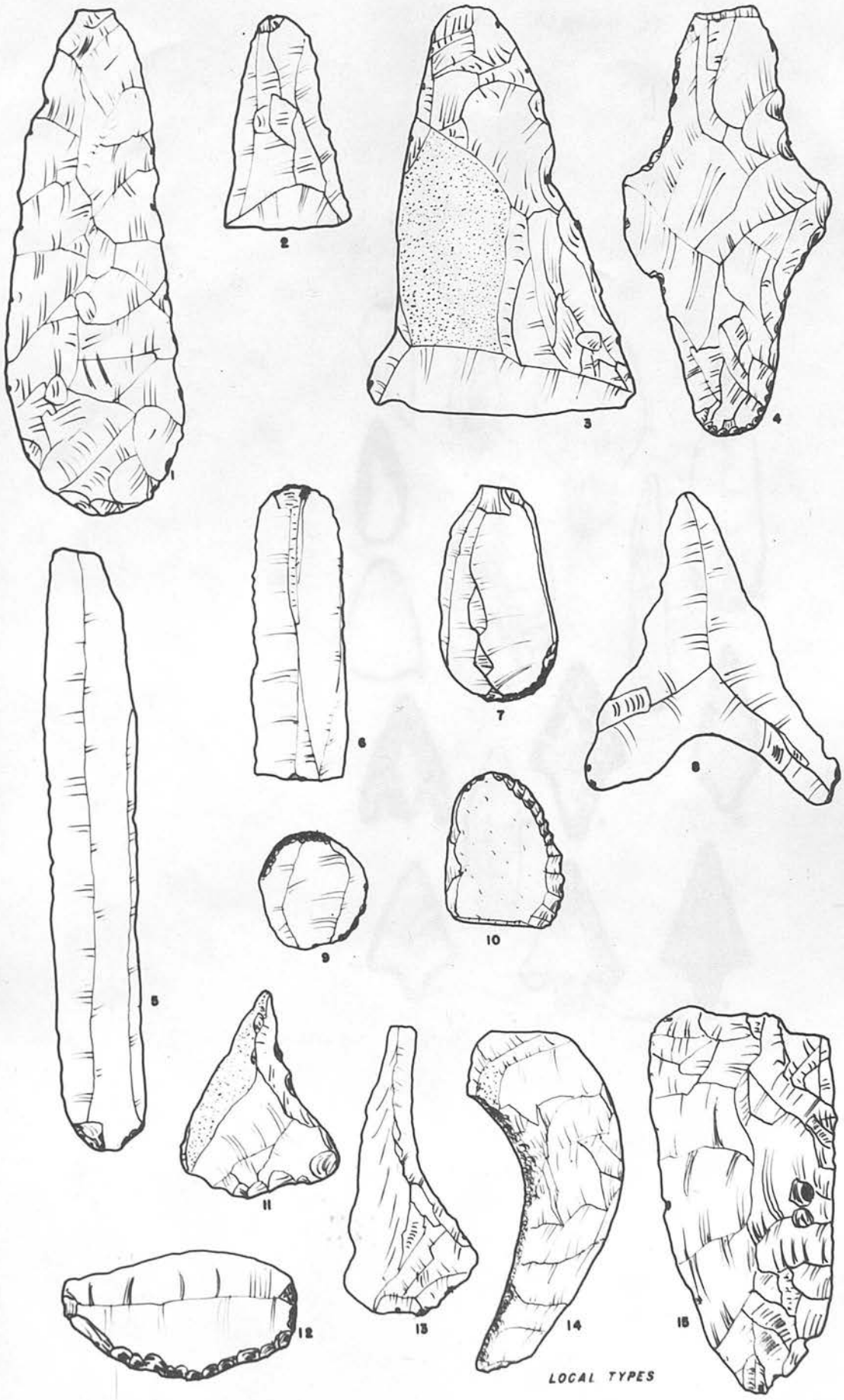
Figure 36

Figure 37



FLINT MINE TYPES

Figure 38



LOCAL TYPES

Figure 39

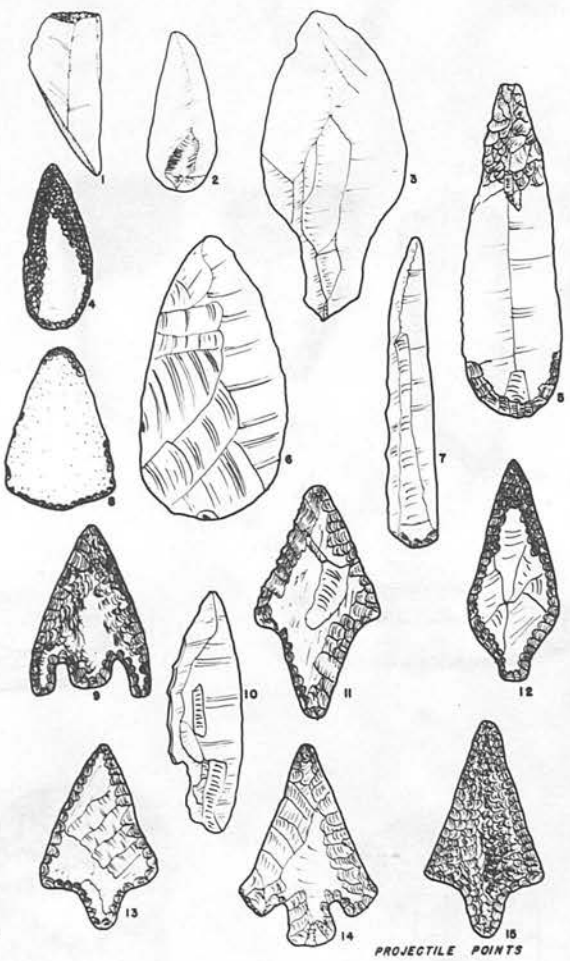
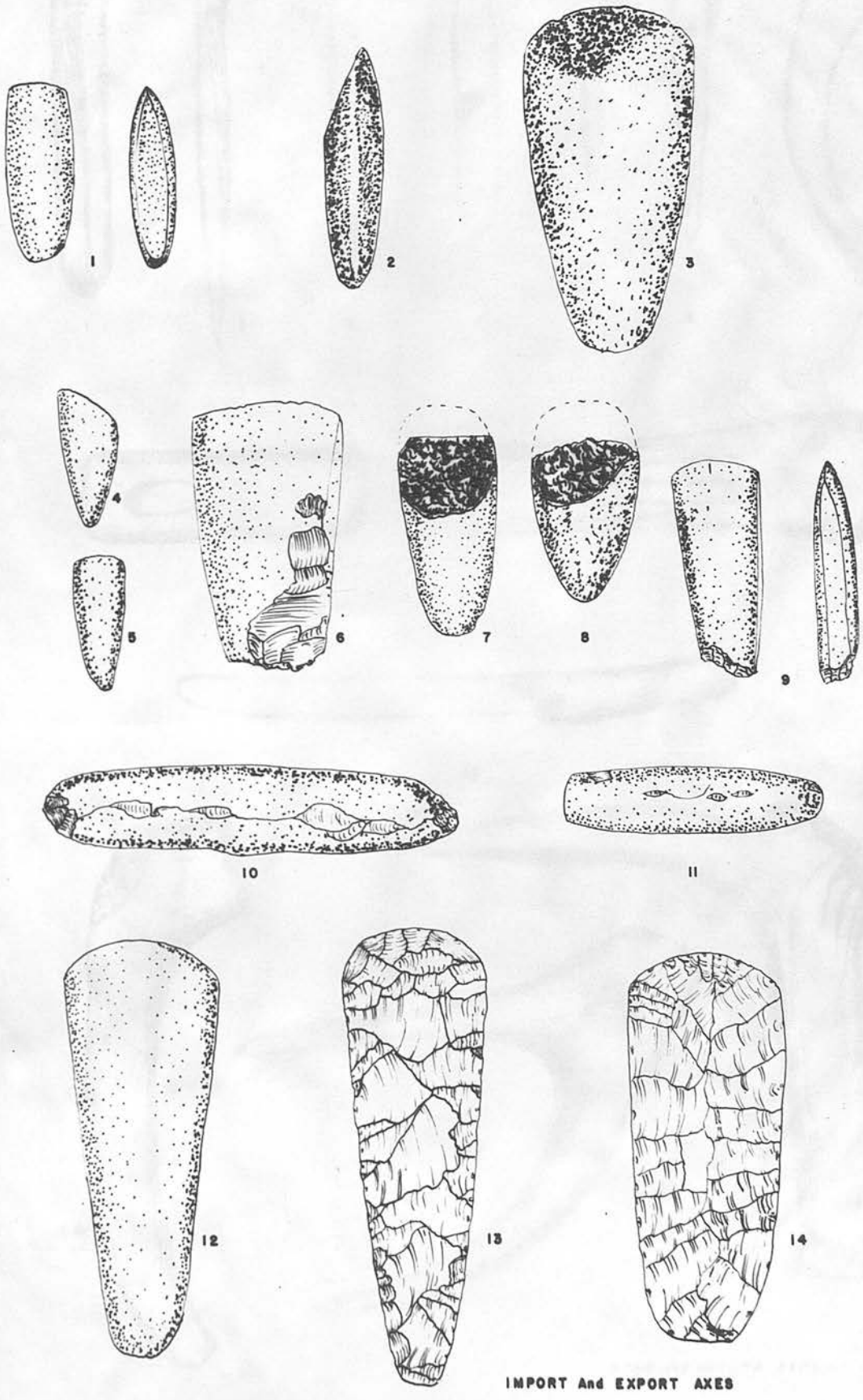
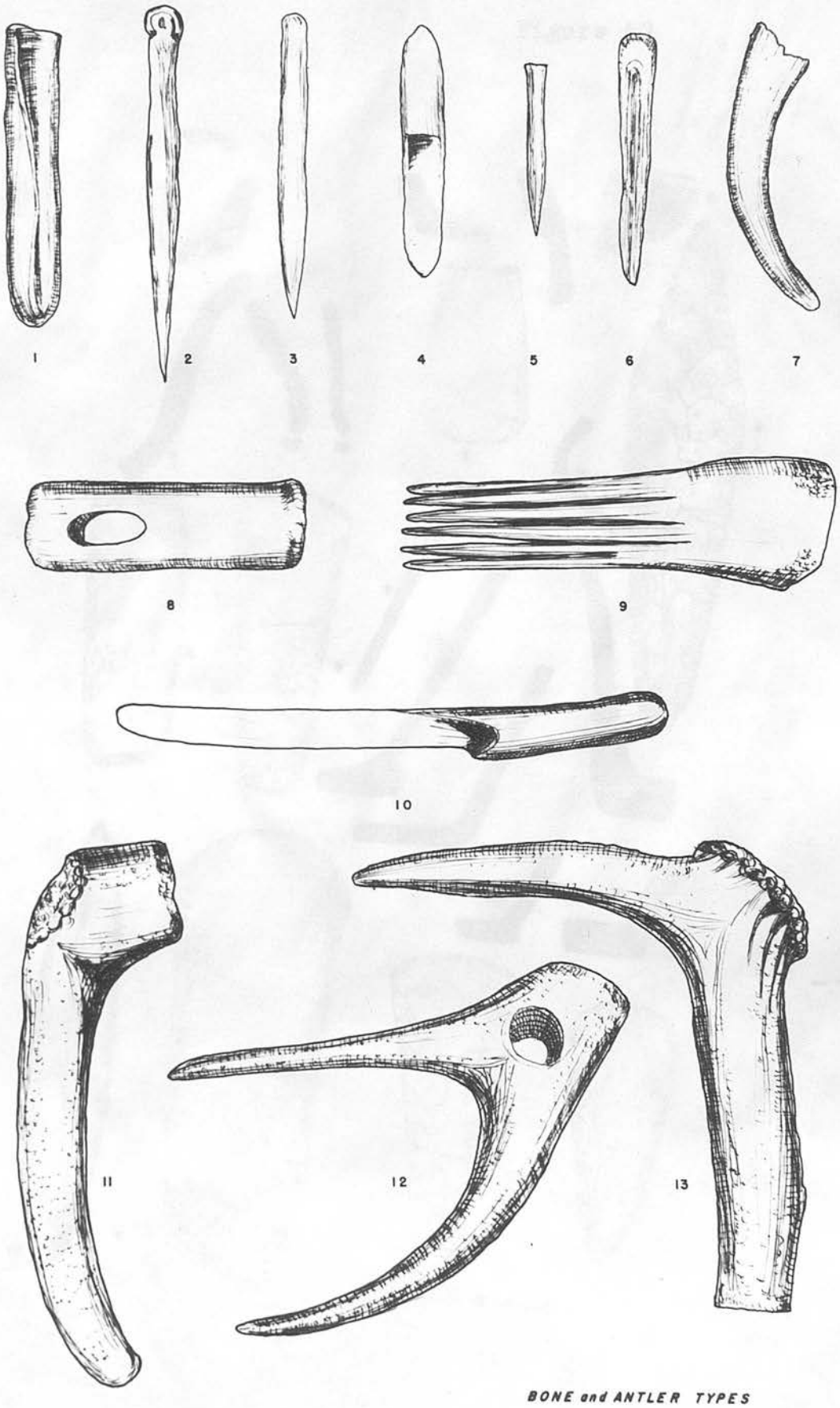


Figure 40



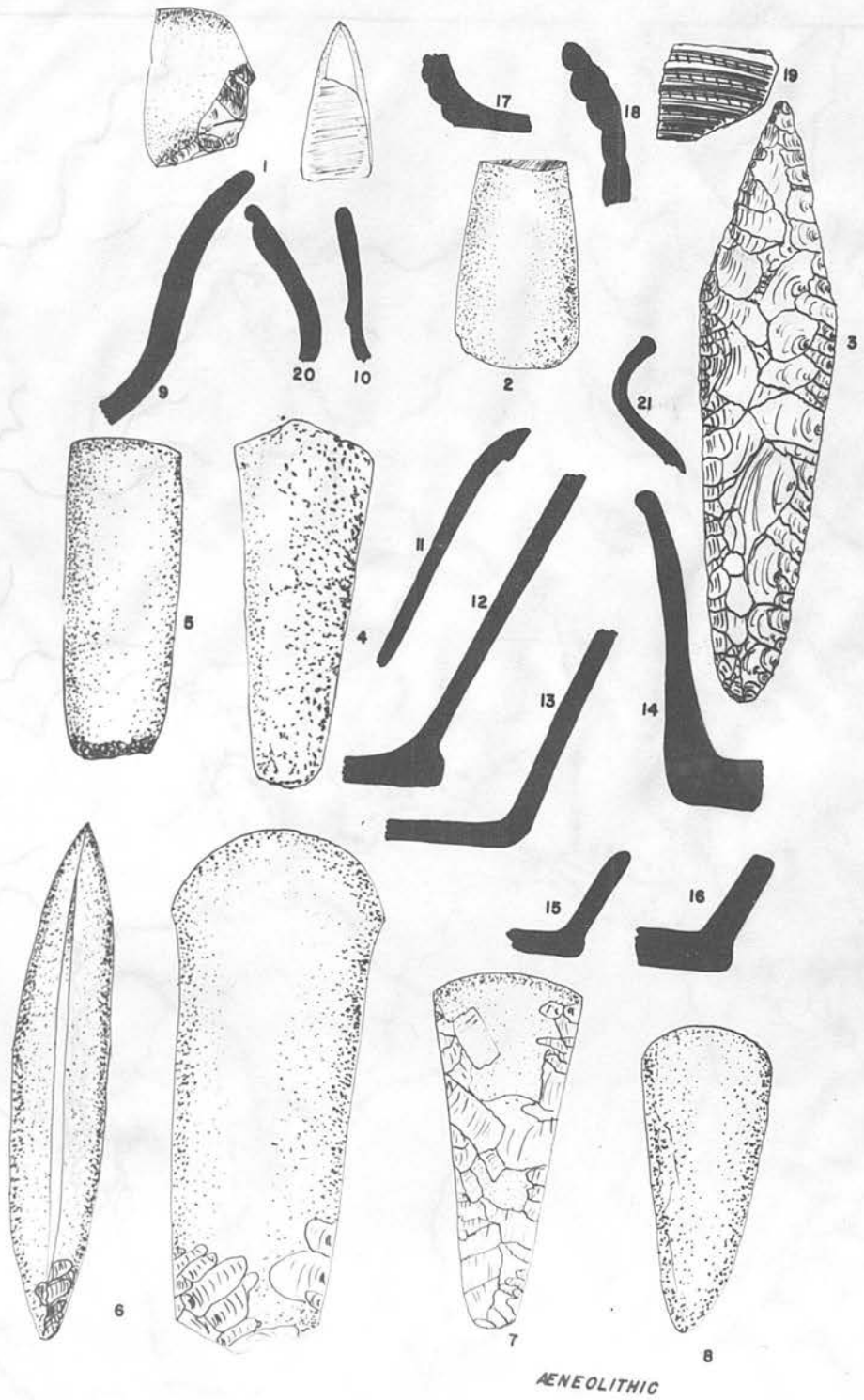
IMPORT And EXPORT AXES

Figure 41



BONE and ANTLER TYPES

Figure 42



ÆNEOLITHIC

Figure 43

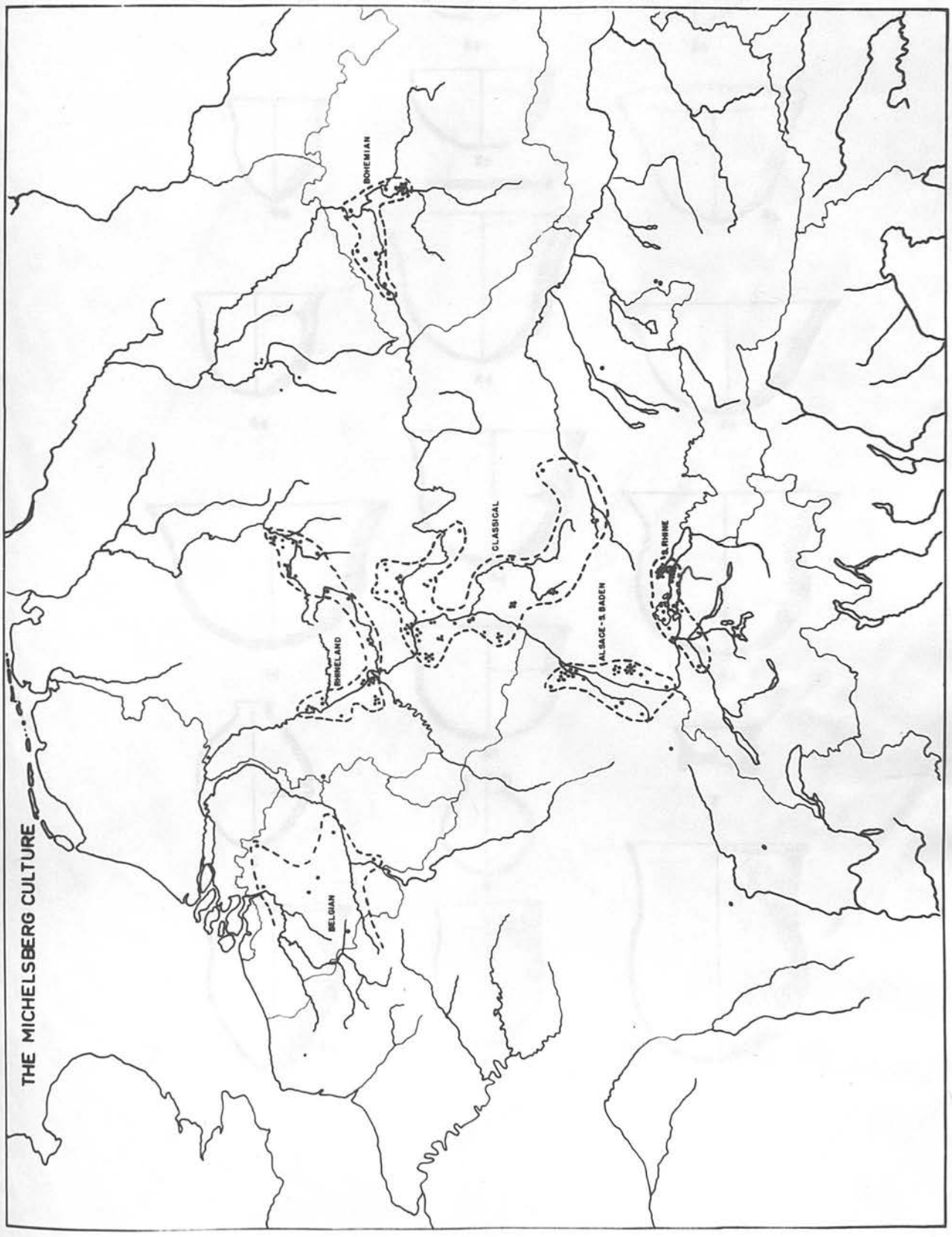

THE MICHELSBERG CULTURE
BELGIAN
RHINELAND
CLASSICAL
ALSACE-S.BADEN
S.RHINE
BOHEMIAN

Figure 44

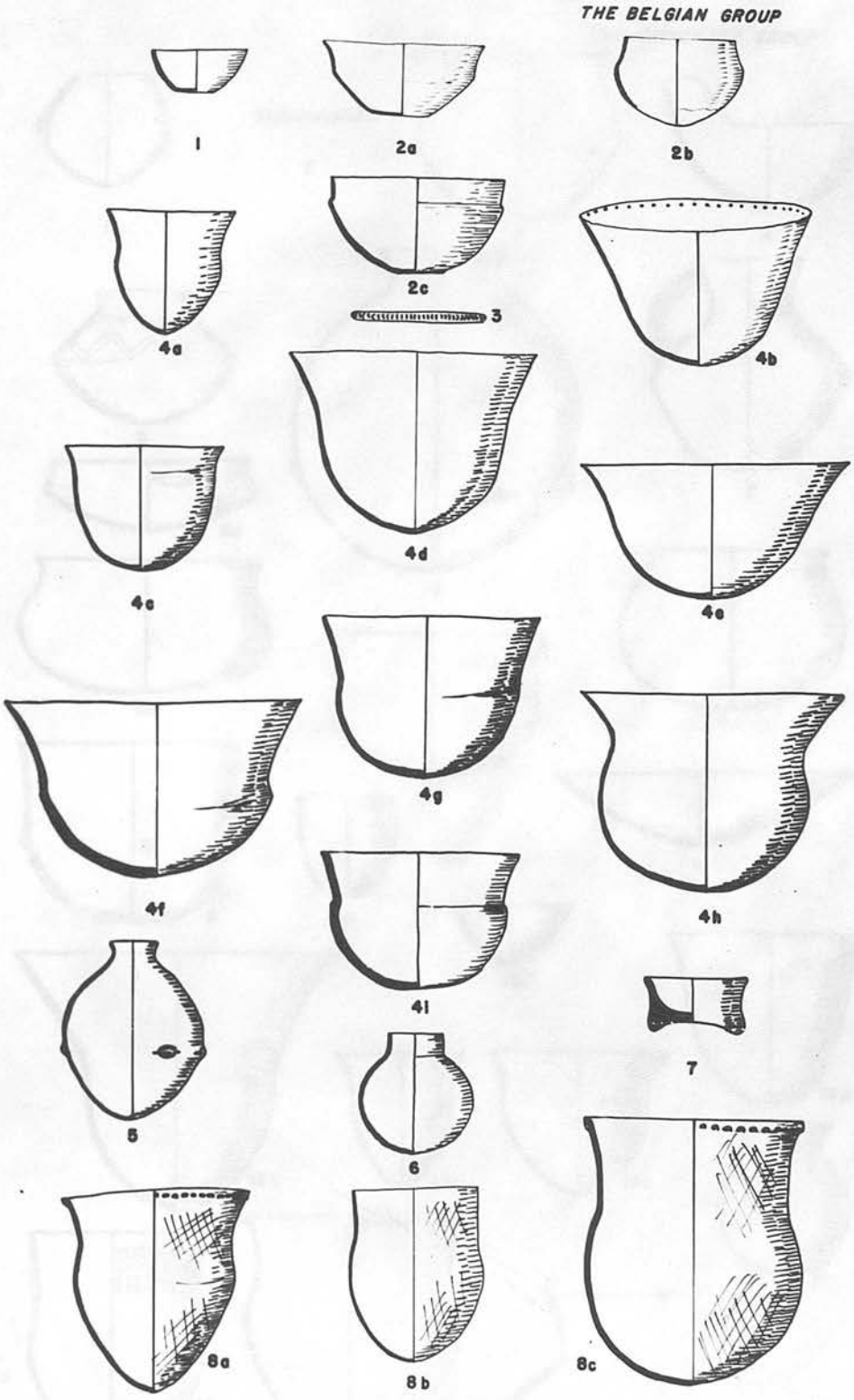

THE BELGIAN GROUP
1
2a
2b
2c
3
4a
4b
4c
4d
4e
4f
4g
4h
4i
5
6
7
8a
8b
8c

Figure 45

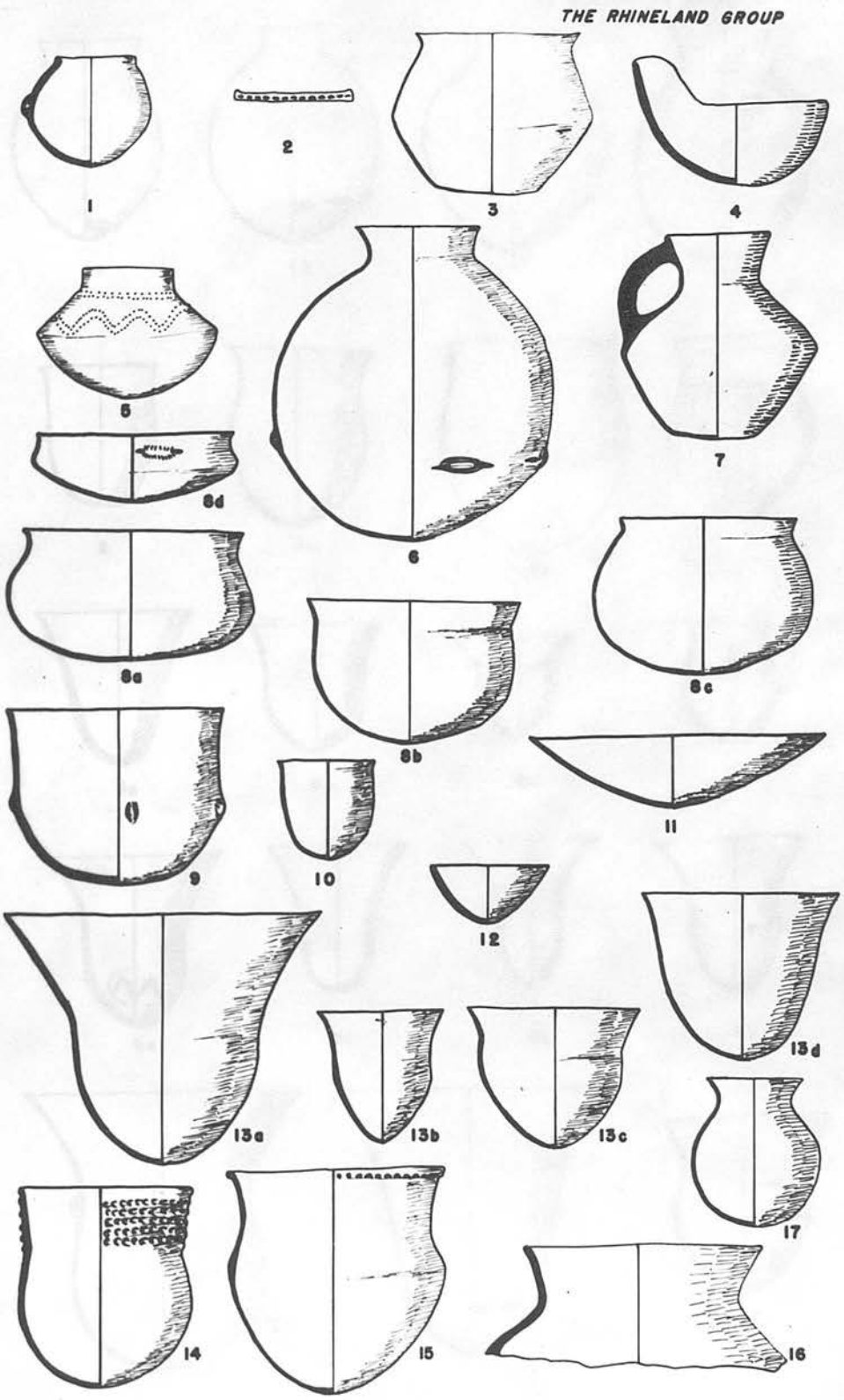

THE RHINELAND GROUP
1
2
3
4
5
6
7
8a
8b
8c
8d
9
10
11
12
13a
13b
13c
13d
14
15
16
17

Figure 46

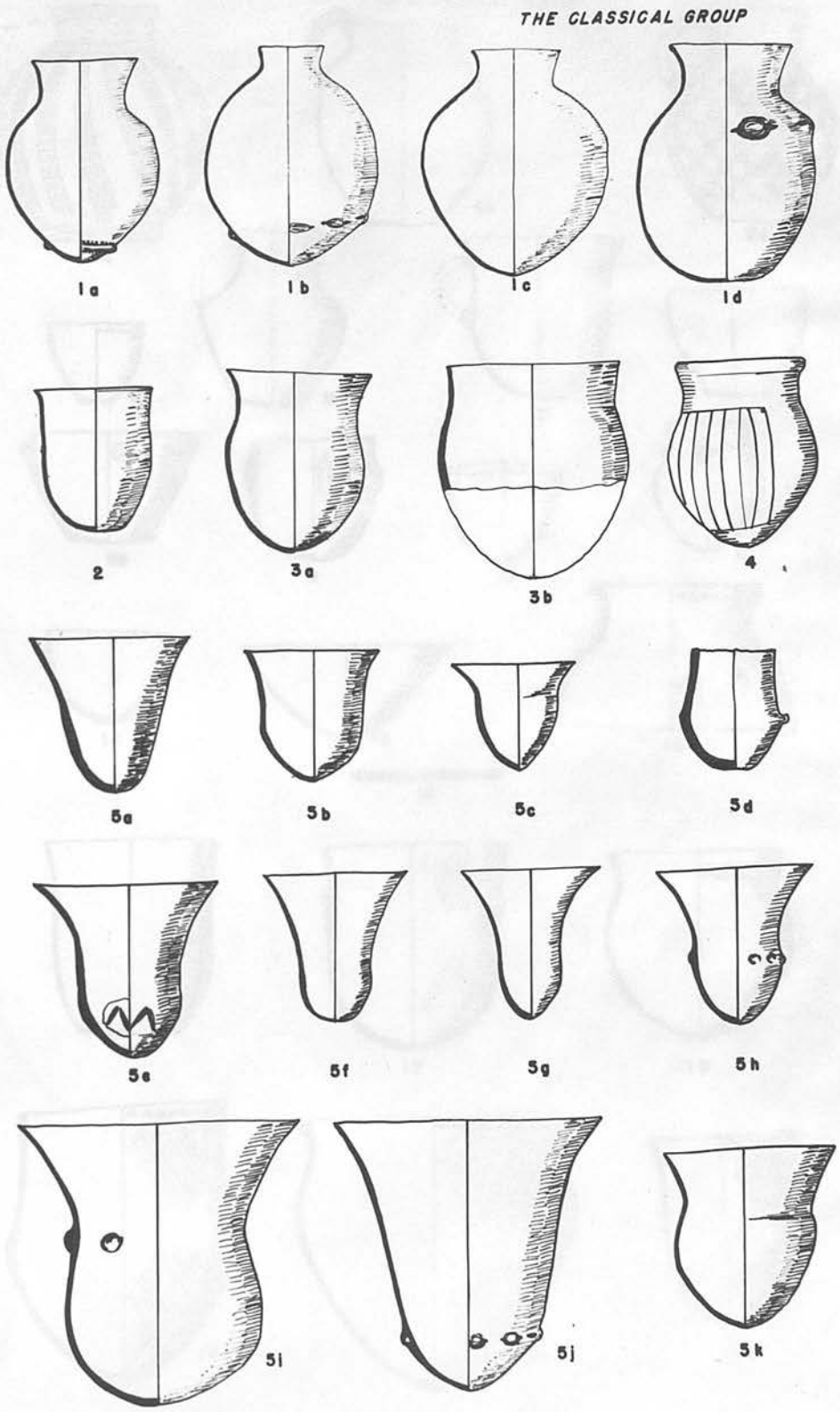

THE CLASSICAL GROUP
1a
1b
1c
1d
2
3a
3b
4
5a
5b
5c
5d
5e
5f
5g
5h
5i
5j
5k

Figure 47

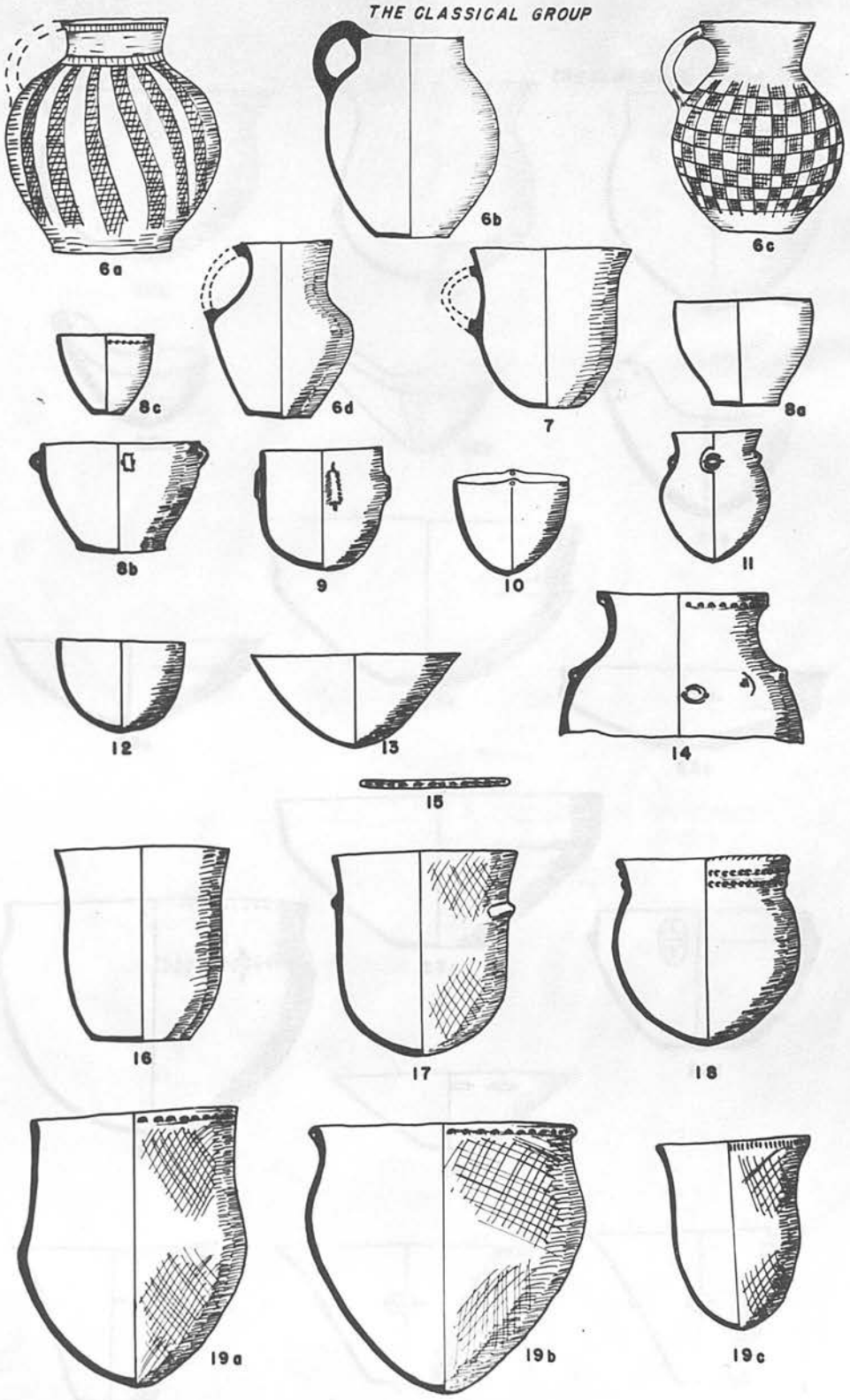

THE CLASSICAL GROUP
6a
6b
6c
6d
7
8a
8b
8c
9
10
11
12
13
14
15
16
17
18
19a
19b
19c

Figure 48

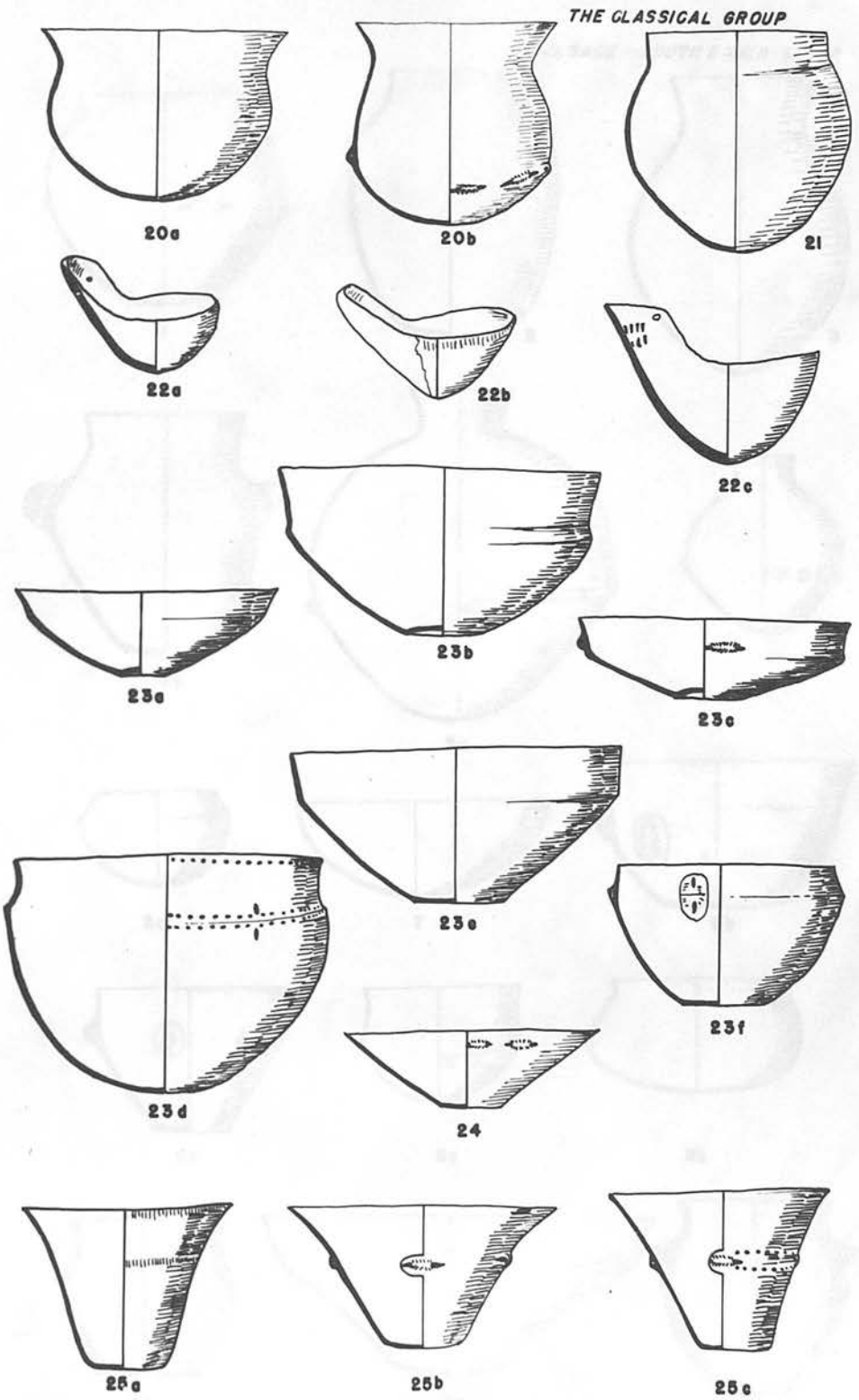

THE CLASSICAL GROUP
20a
20b
21
22a
22b
22c
23b
23a
23c
23e
23d
23f
24
25a
25b
25c

Figure 49

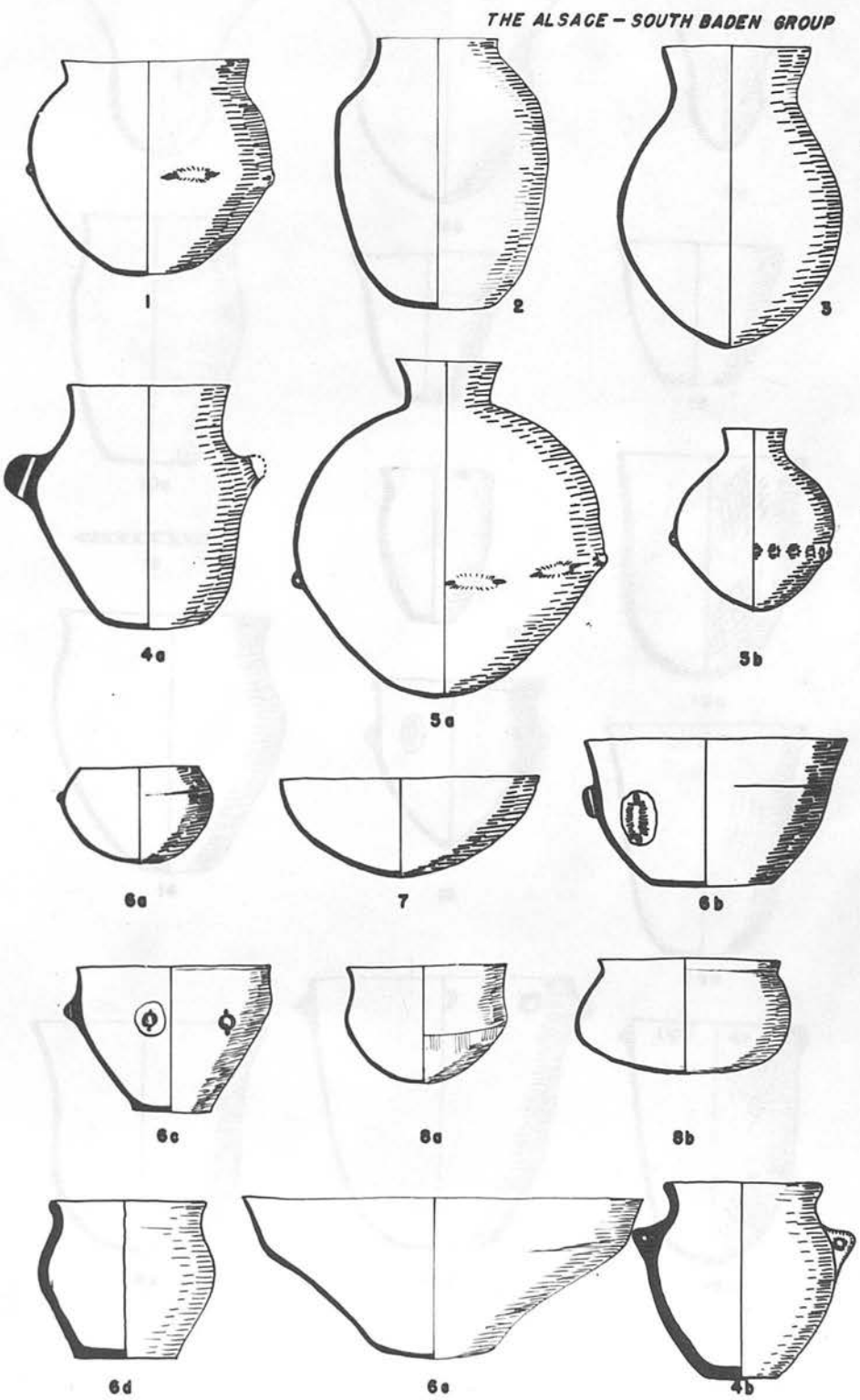

THE ALSACE - SOUTH BADEN GROUP
1
2
3
4a
5a
5b
6a
7
6b
6c
8a
8b
6d
6e
4b

Figure 50

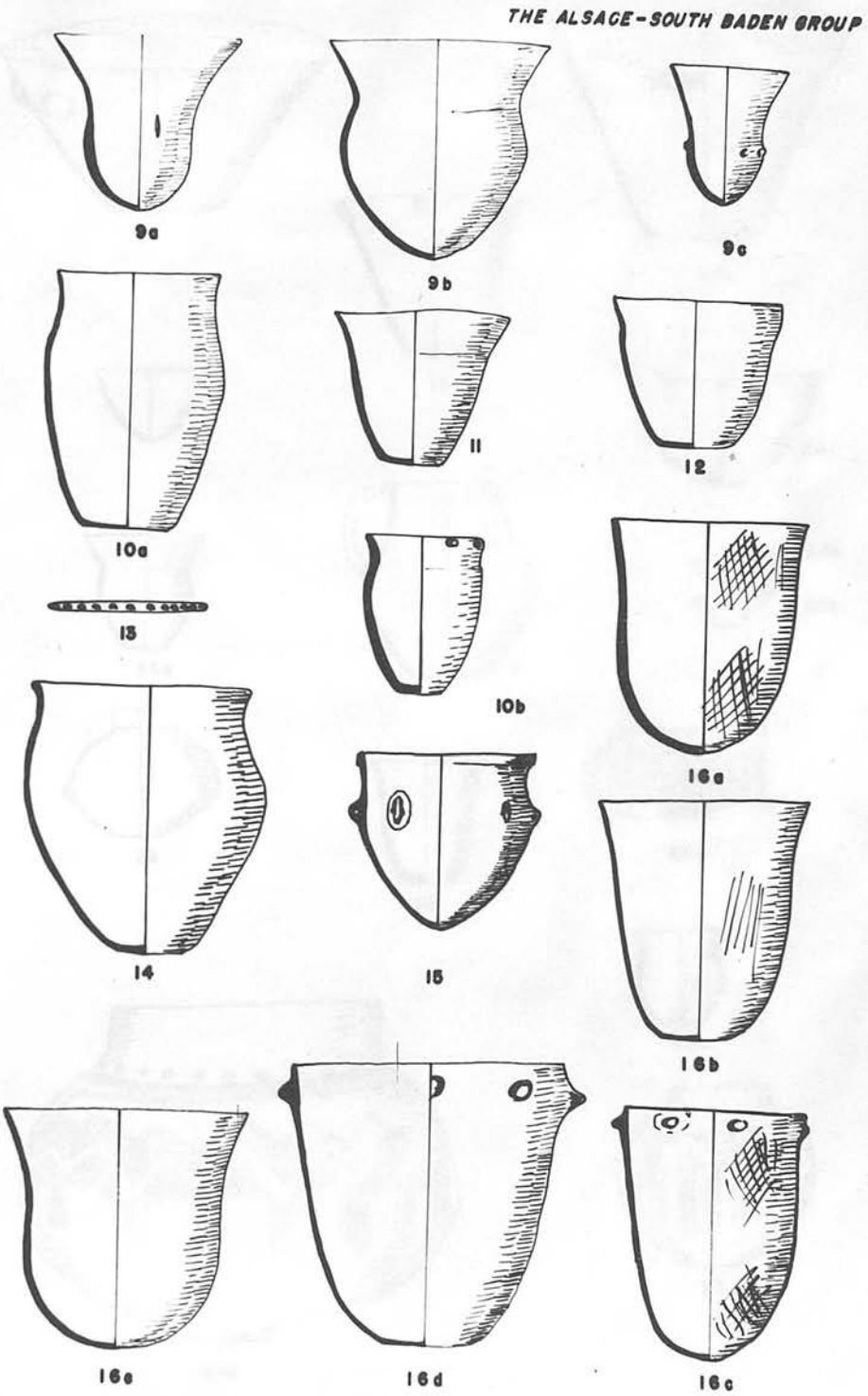

THE ALSACE-SOUTH BADEN GROUP
9a
9b
9c
10a
11
12
13
10b
16a
14
15
16b
16e
16d
16c

Figure 51

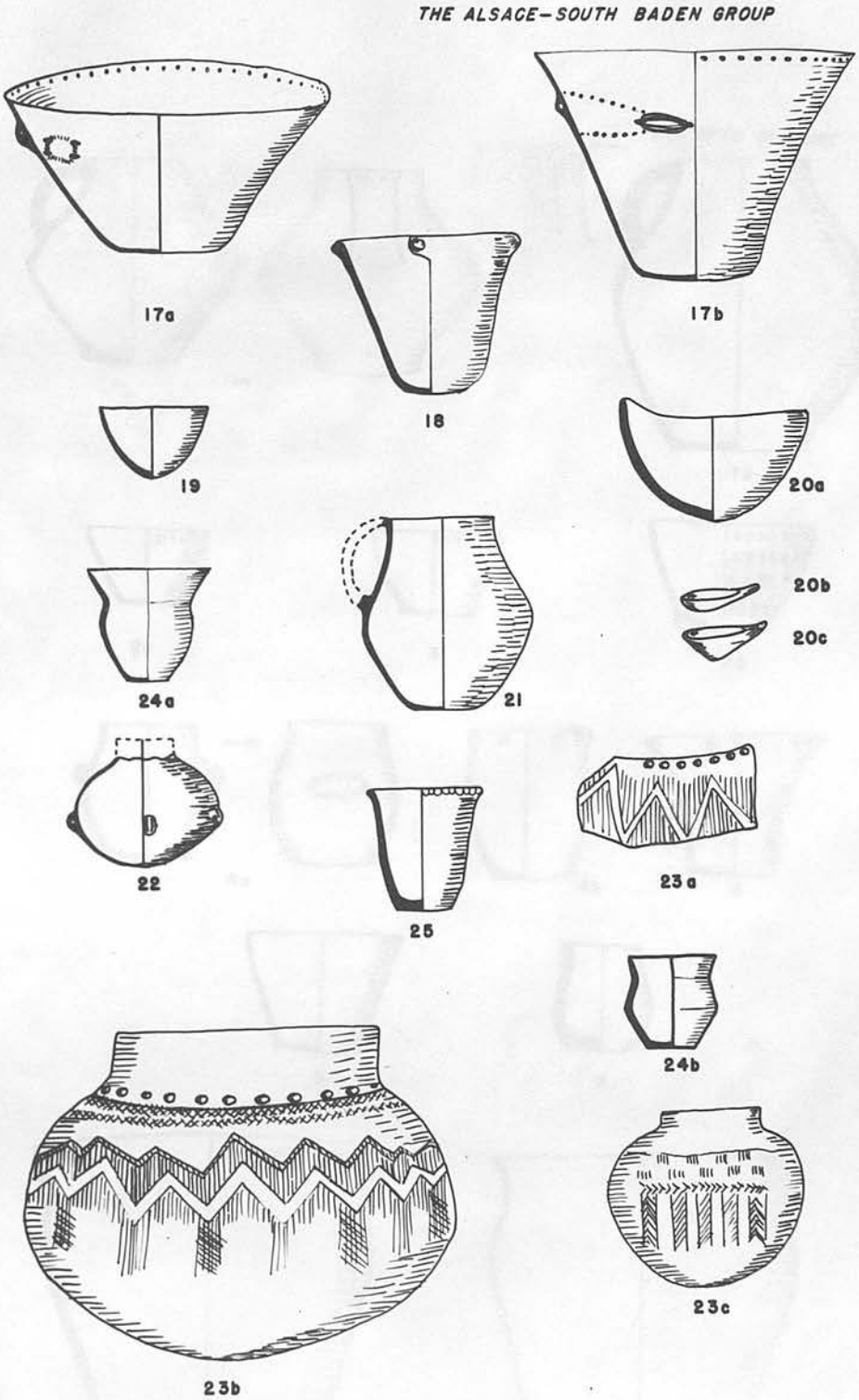

THE ALSACE-SOUTH BADEN GROUP
17a
17b
18
19
20a
20b
20c
24a
21
22
25
23a
24b
23b
23c

Figure 52

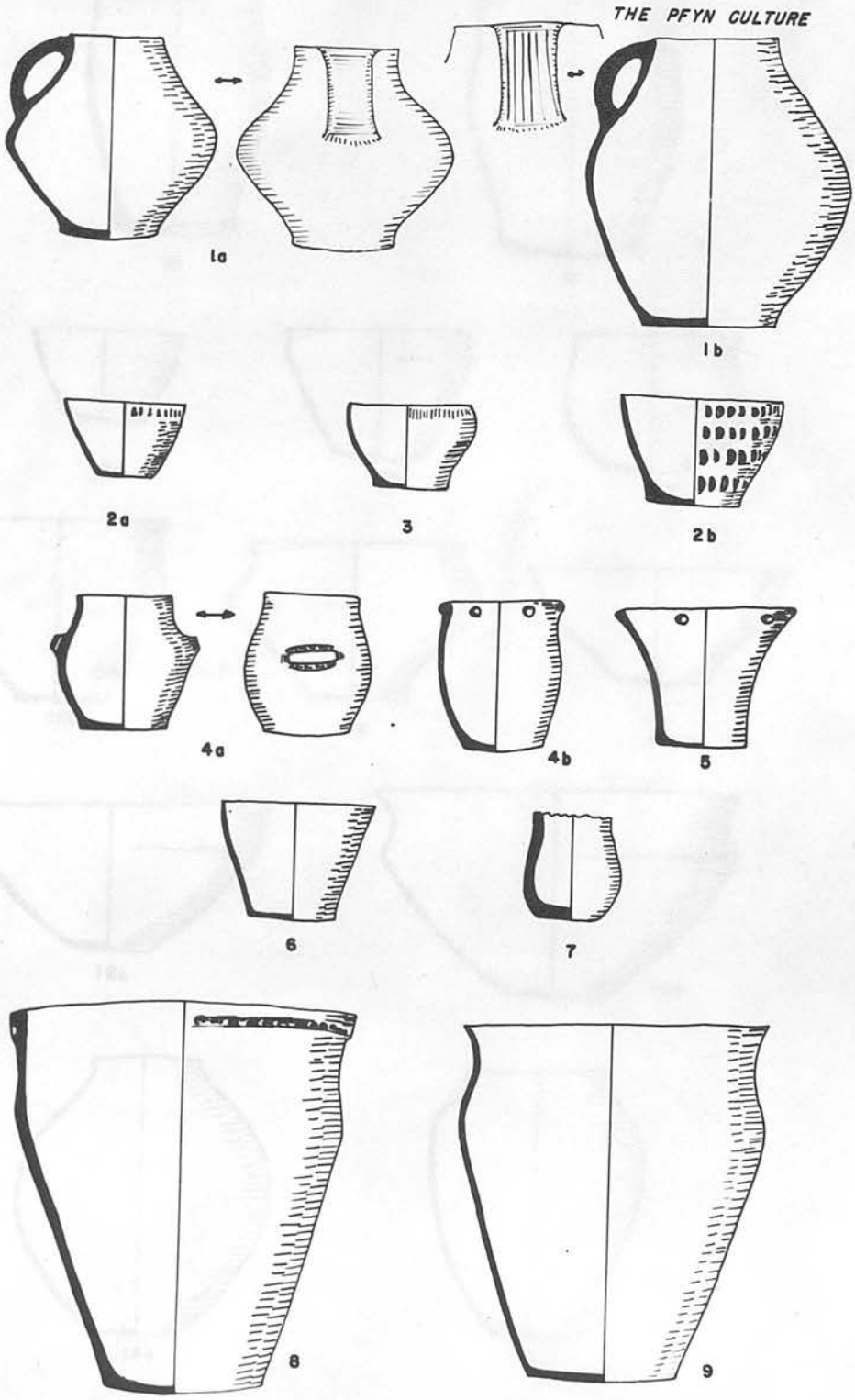


Figure 53

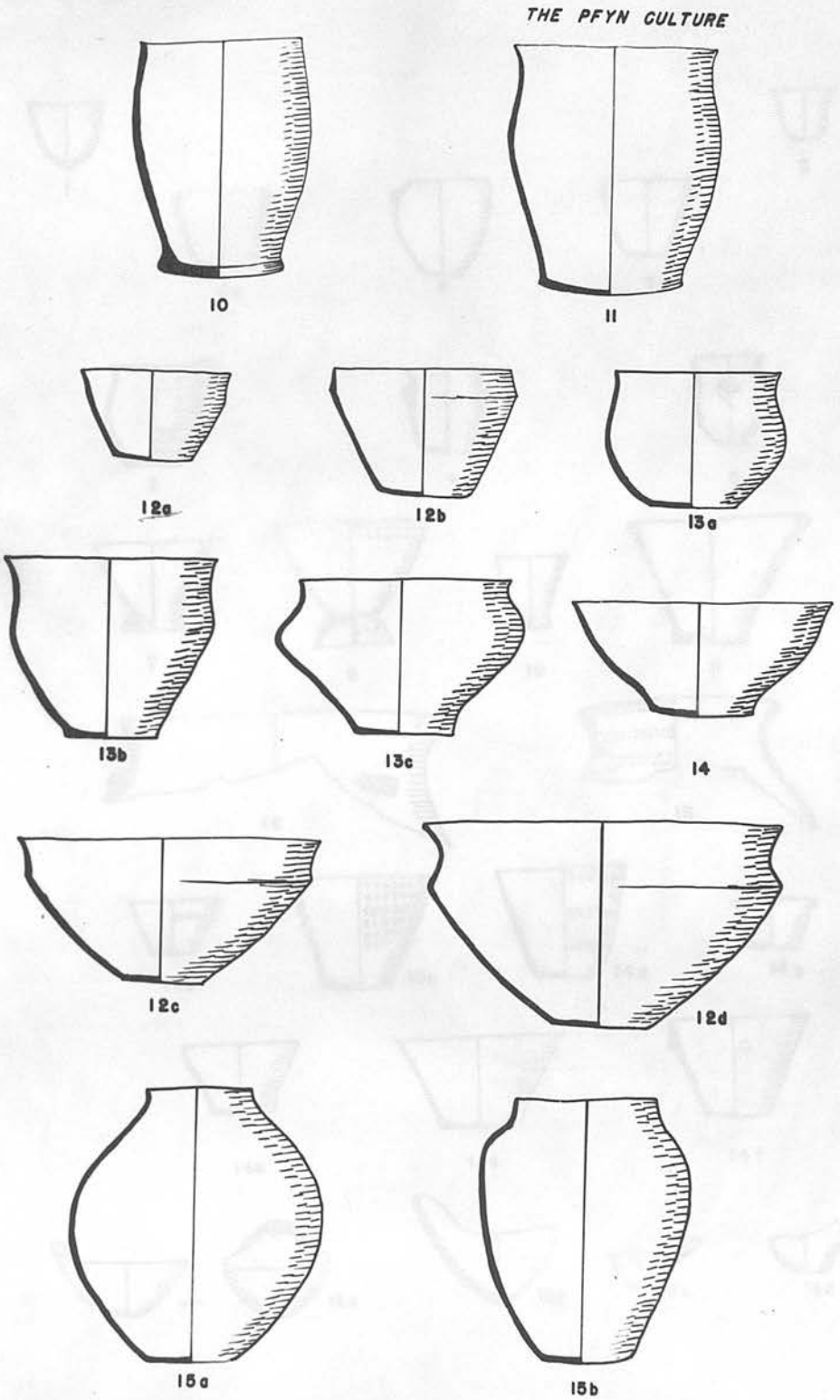


Figure 54

THE SOUTH RHINE-BODENSEE GROUP

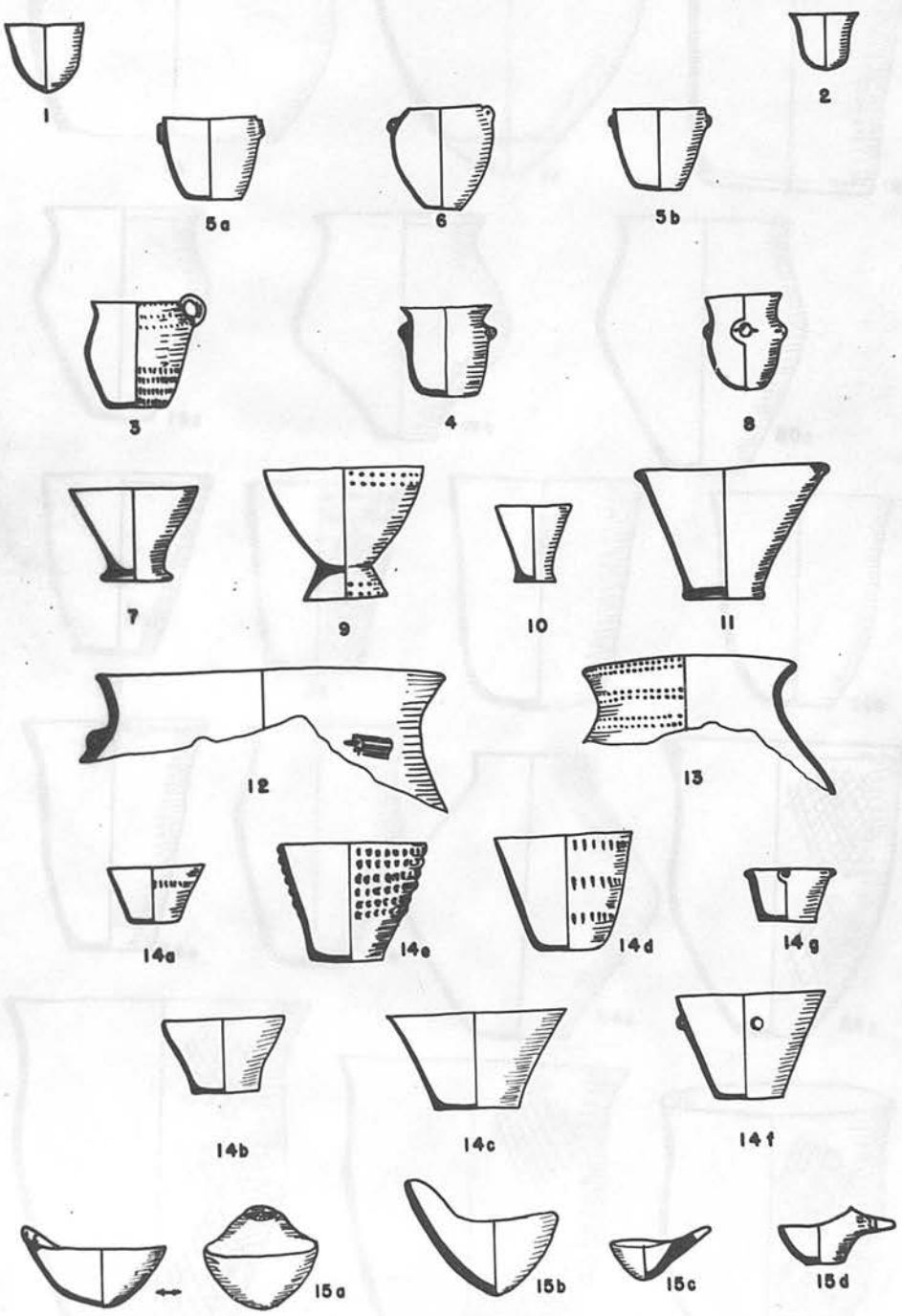


Figure 55

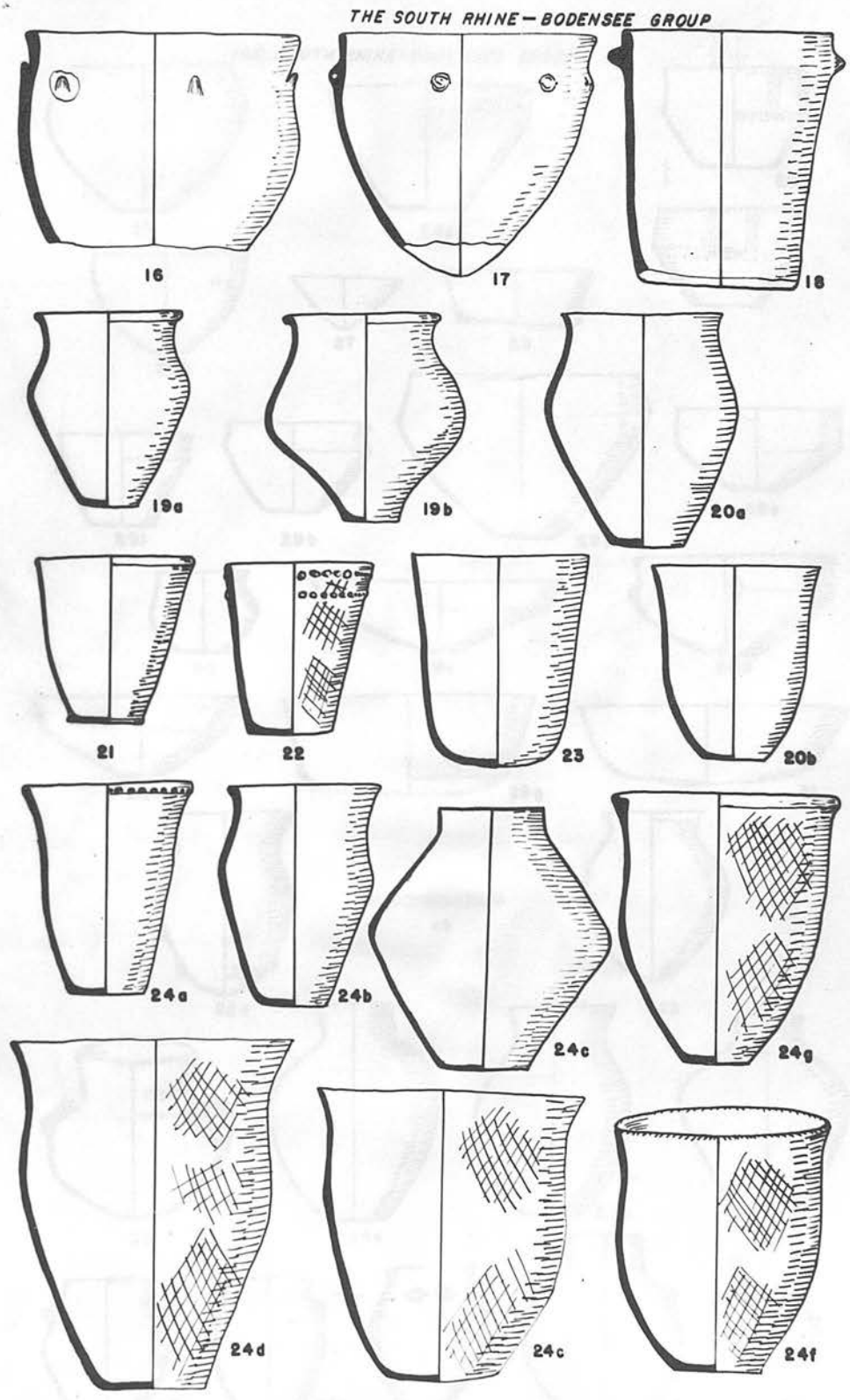

THE SOUTH RHINE – BODENSEE GROUP
16
17
18
19a
19b
20a
21
22
23
20b
24a
24b
24c
24g
24d
24e
24f

Figure 56

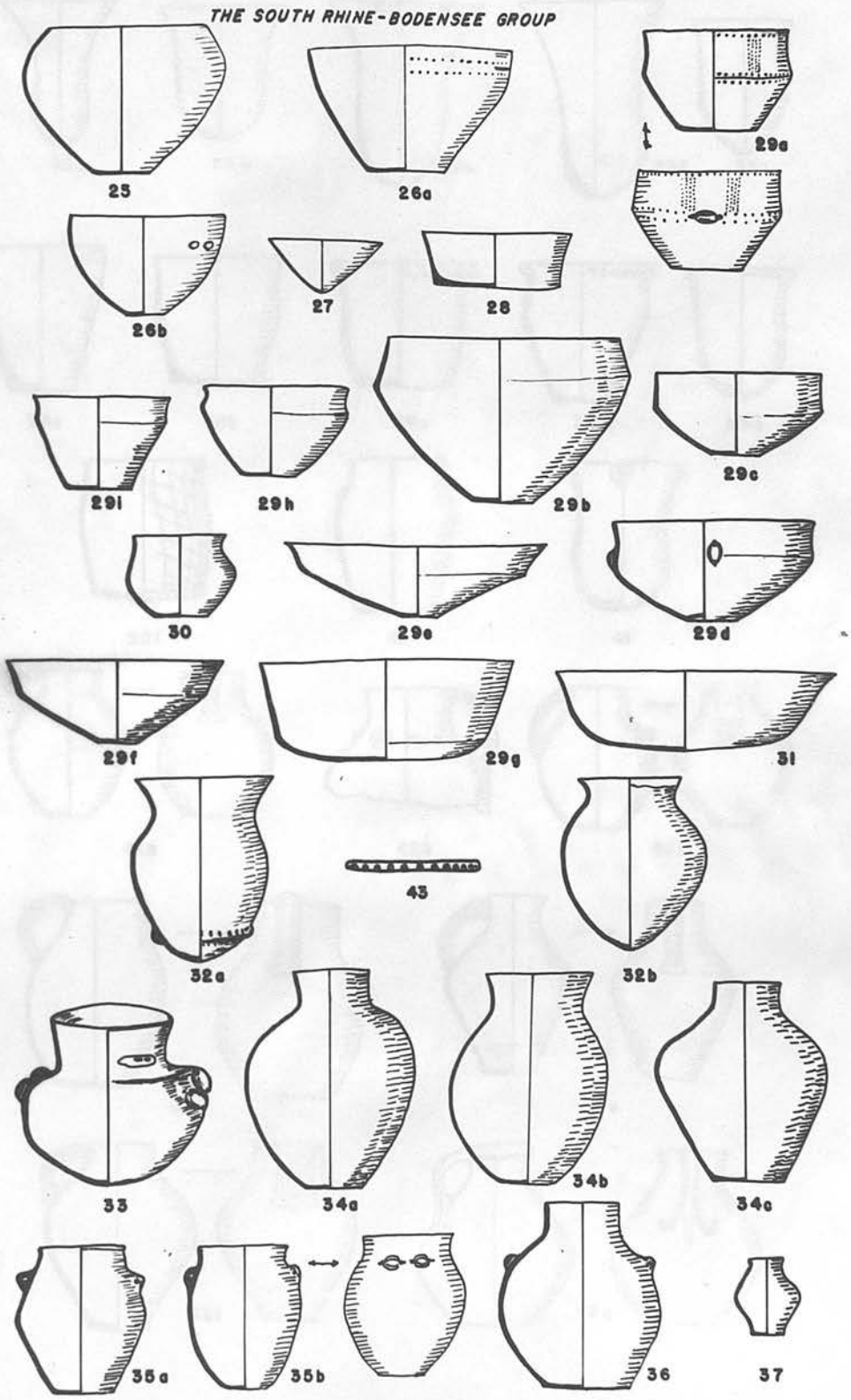

THE SOUTH RHINE-BODENSEE GROUP
25
26a
29a
26b
27
28
29i
29h
29b
29c
30
29e
29d
29f
29g
31
43
32a
32b
33
34a
34b
34c
35a
35b
36
37

Figure 57

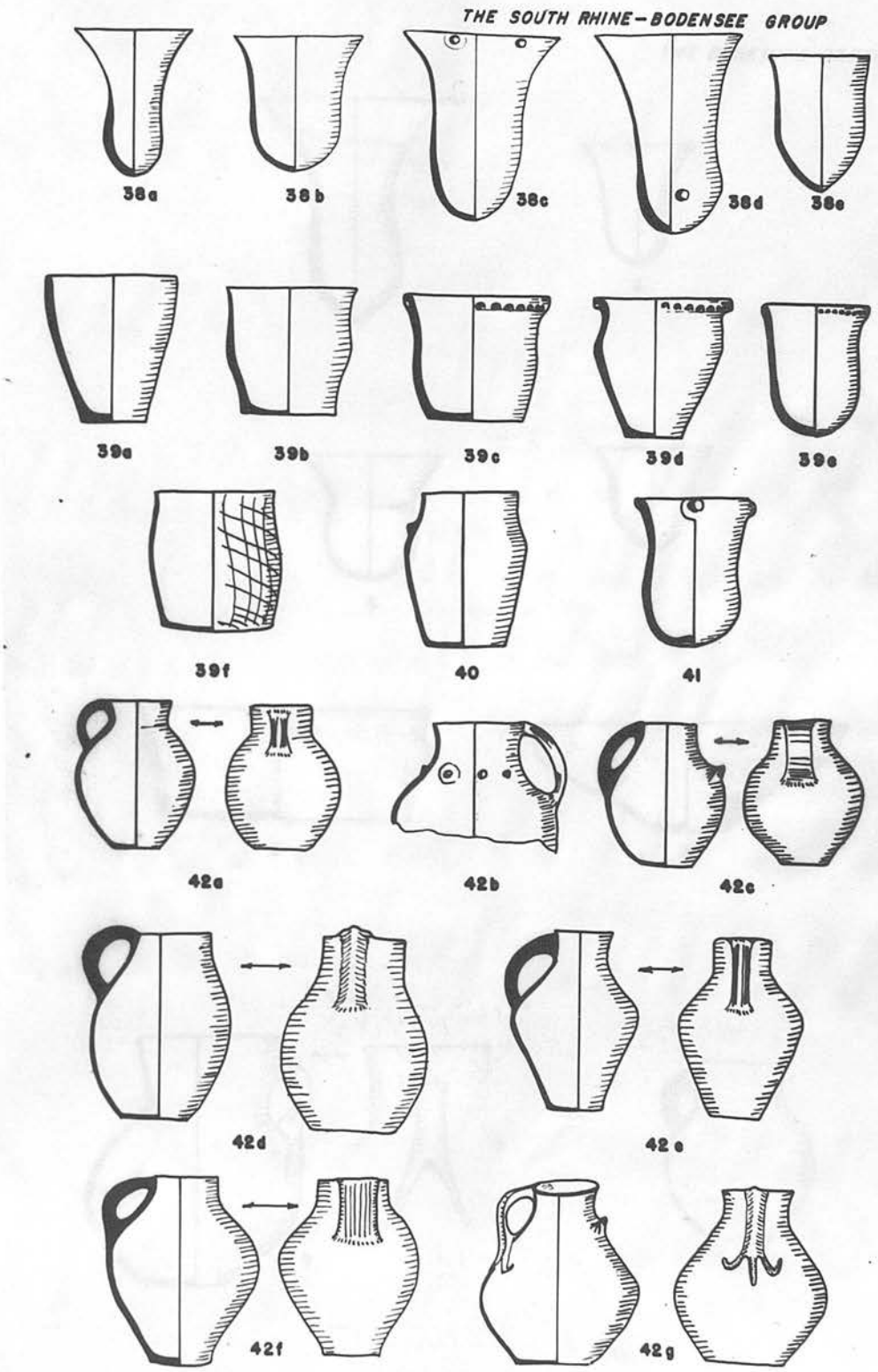

THE SOUTH RHINE-BODENSEE GROUP
38a
38b
38c
38d
38e
39a
39b
39c
39d
39e
39f
40
41
42a
42b
42c
42d
42e
42f
42g

Figure 58

THE BOHEMIAN GROUP

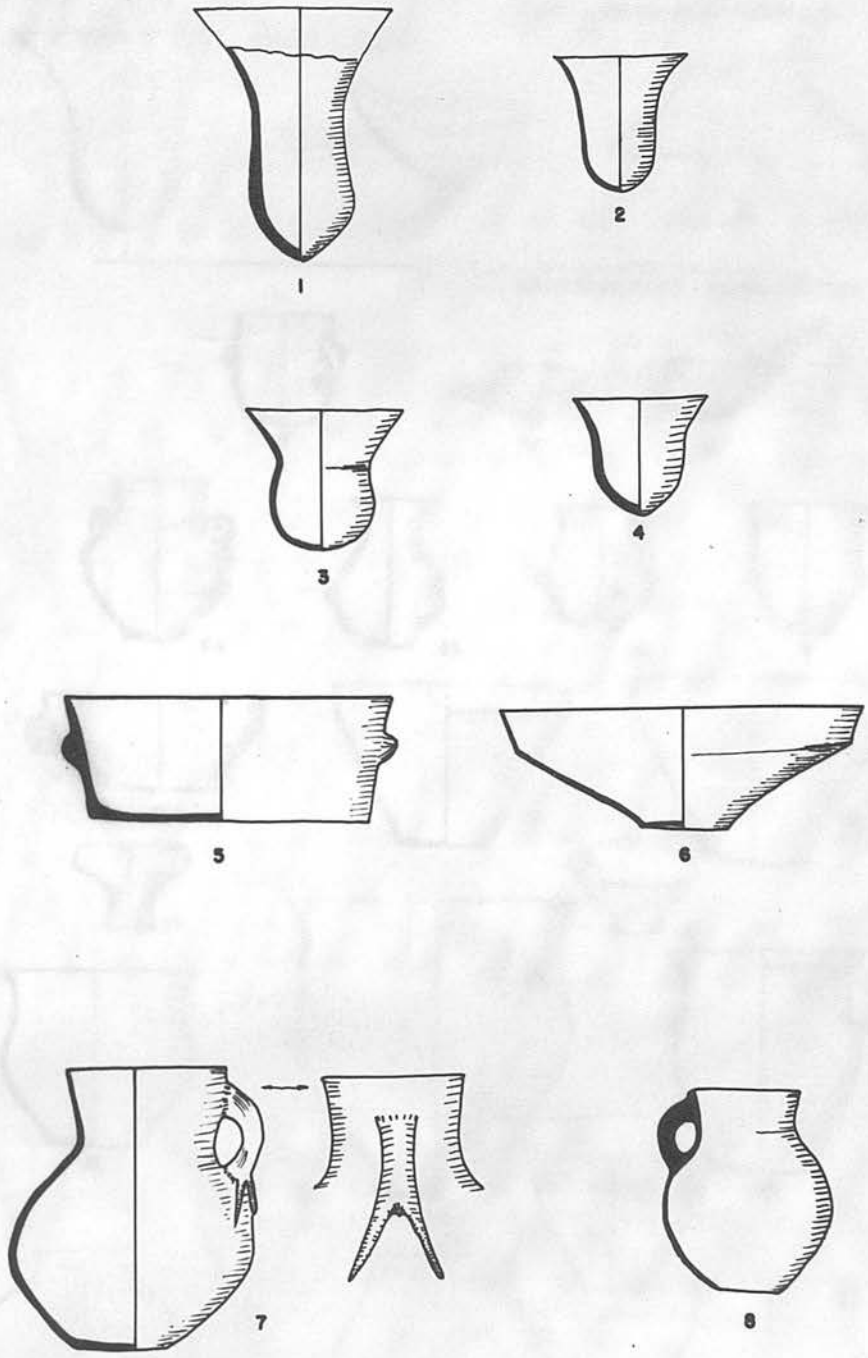


Figure 59

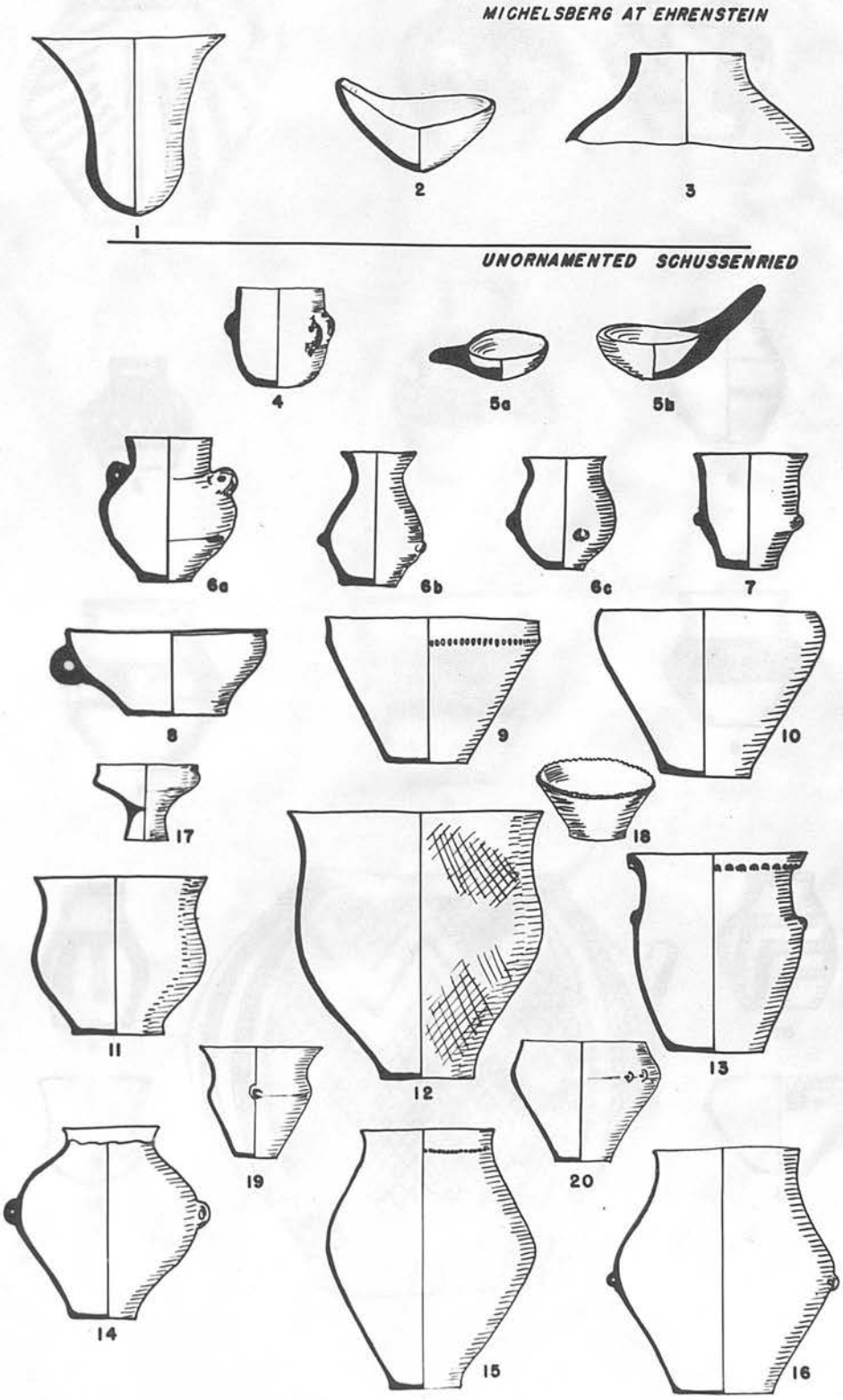

MICHELSBERG AT EHRENSTEIN
1
2
3
UNORNAMENTED SCHUSSENRIED
4
5a
5b
6a
6b
6c
7
8
9
10
17
18
11
12
13
19
20
14
15
16

Figure 60

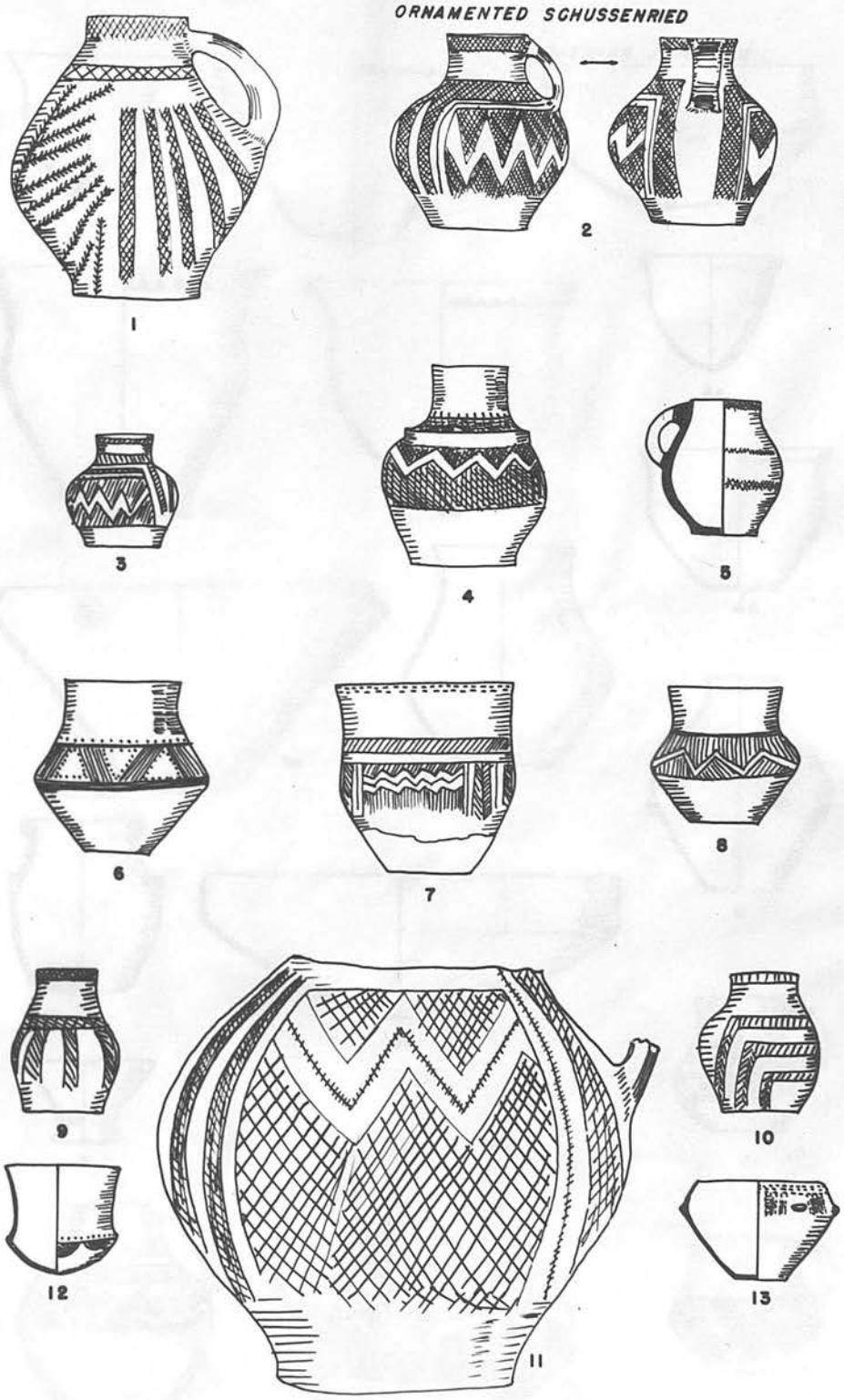


Figure 61

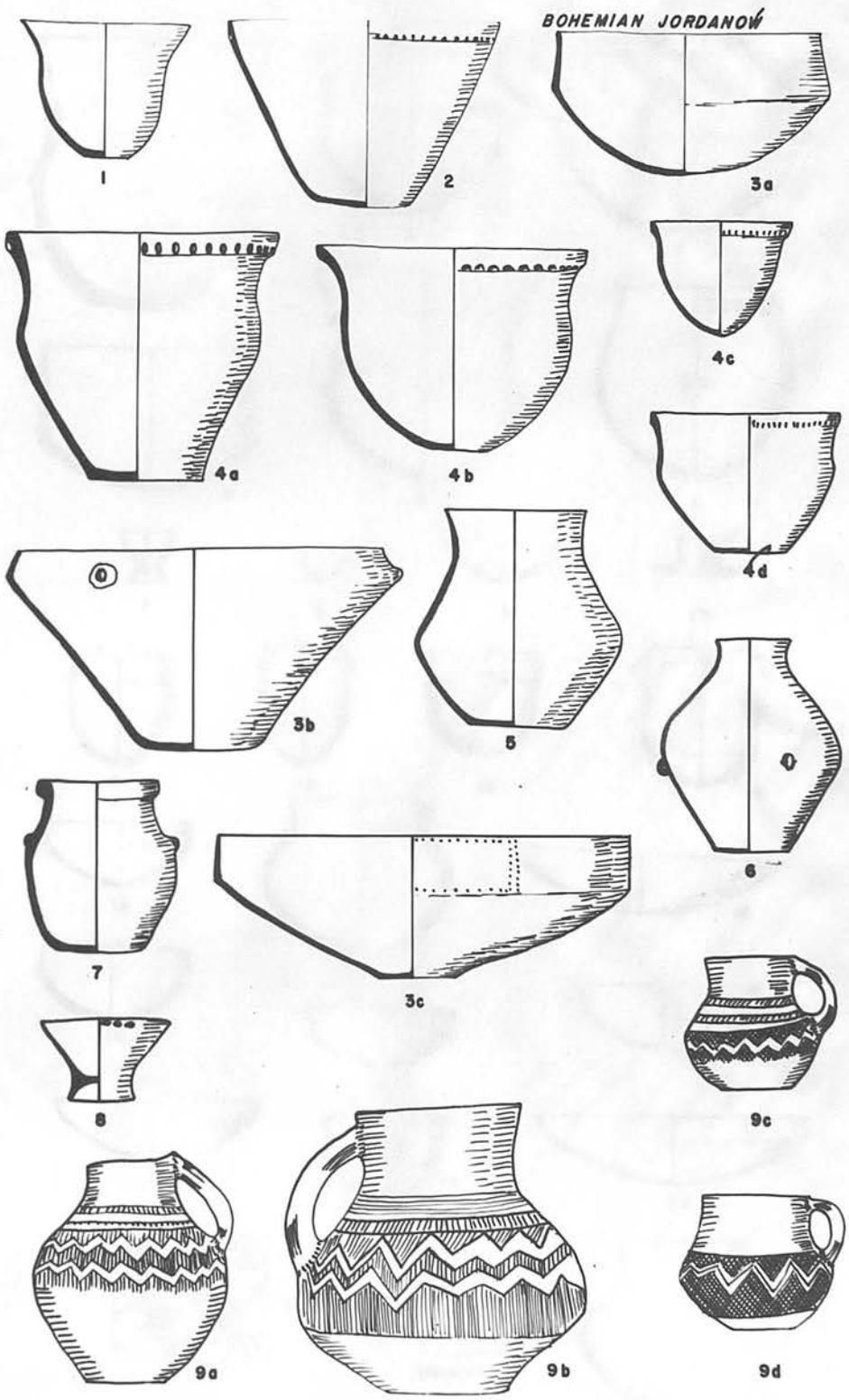


Figure 62

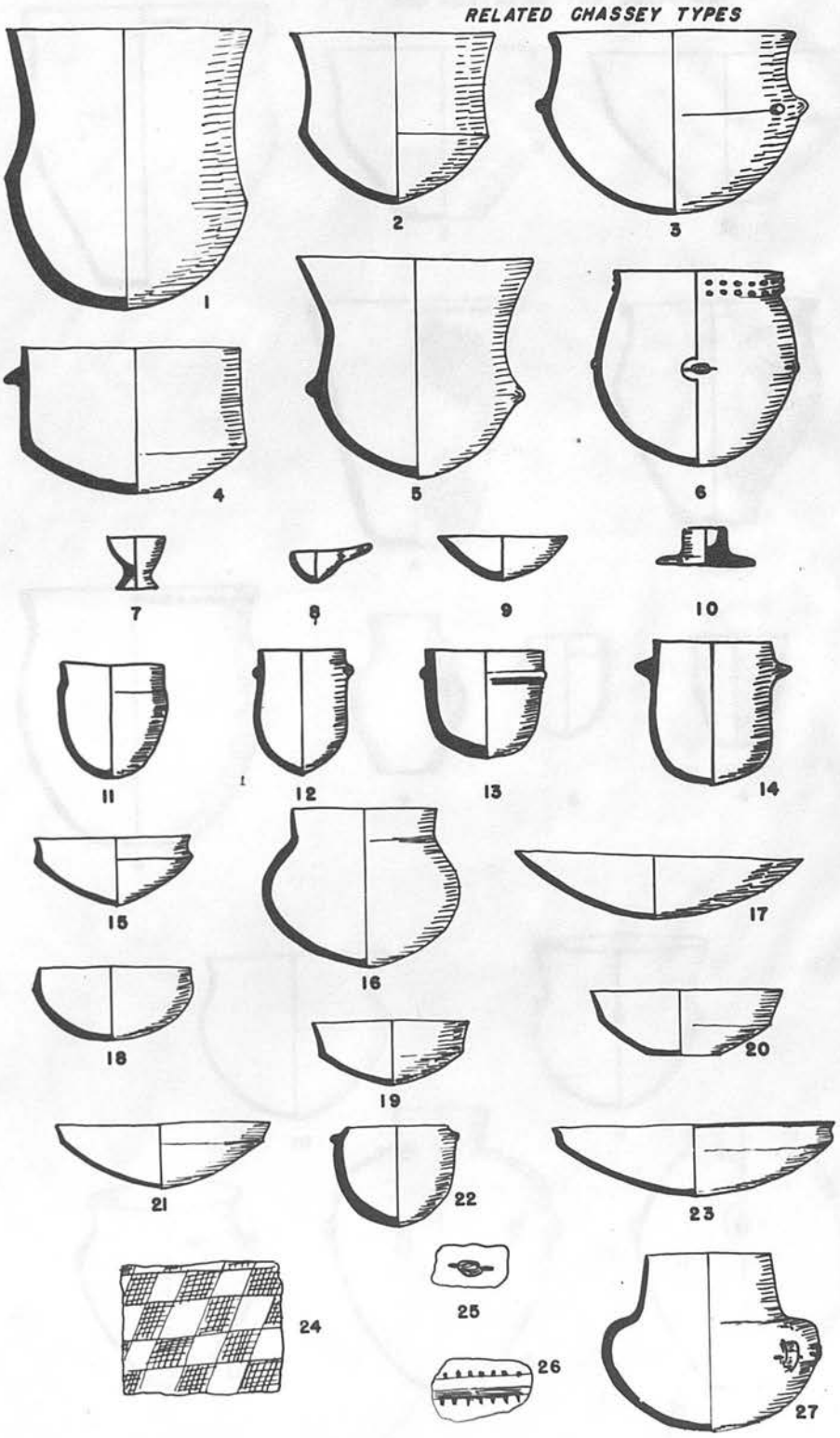

RELATED CHASSEY TYPES
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27

Figure 63

RELATED TYPES FROM JEVISOVICE, ALTHEIM, RHINELAND ROSSEN, BAALBERG AND NORTHERN TRB CULTURES

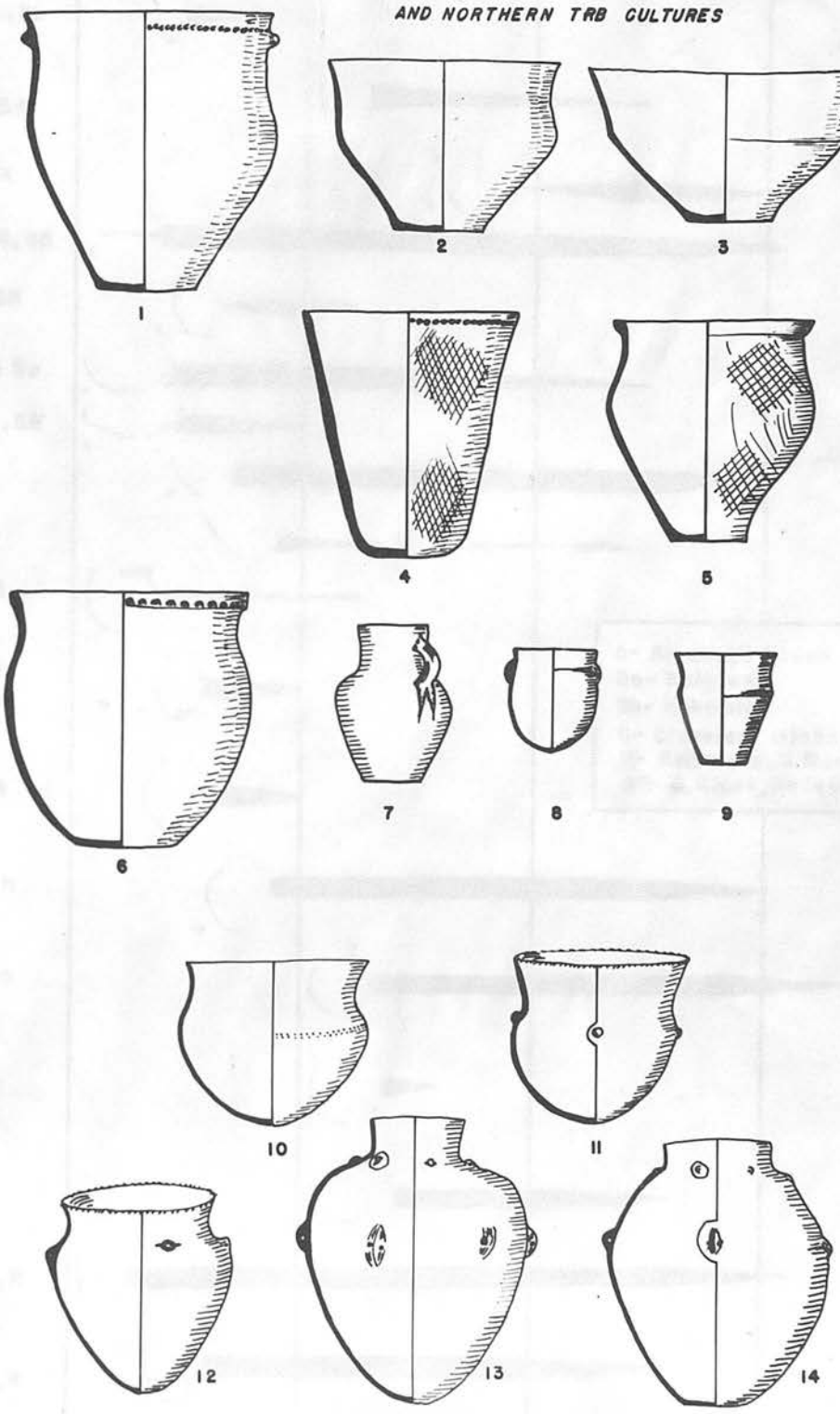


Figure 64

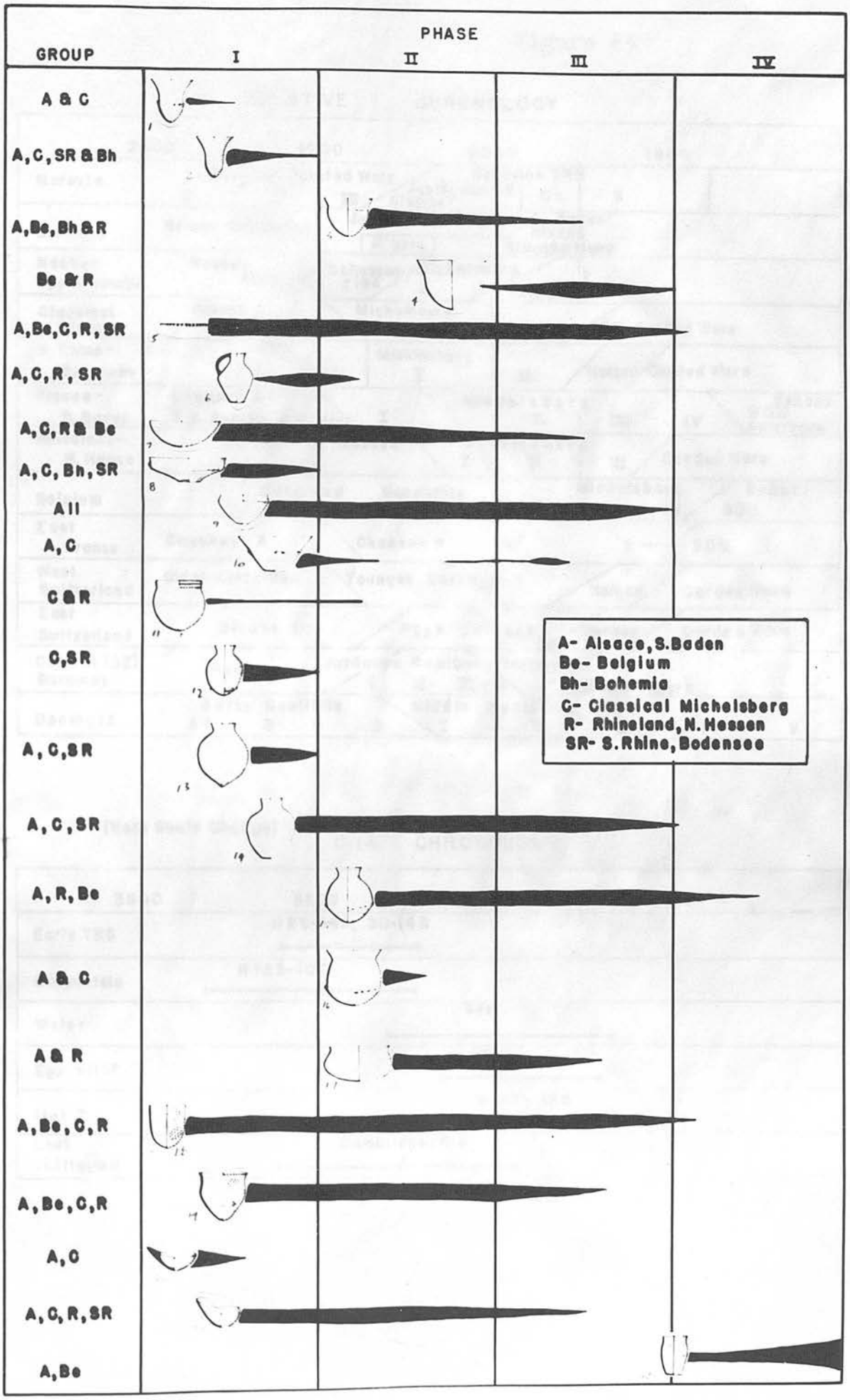
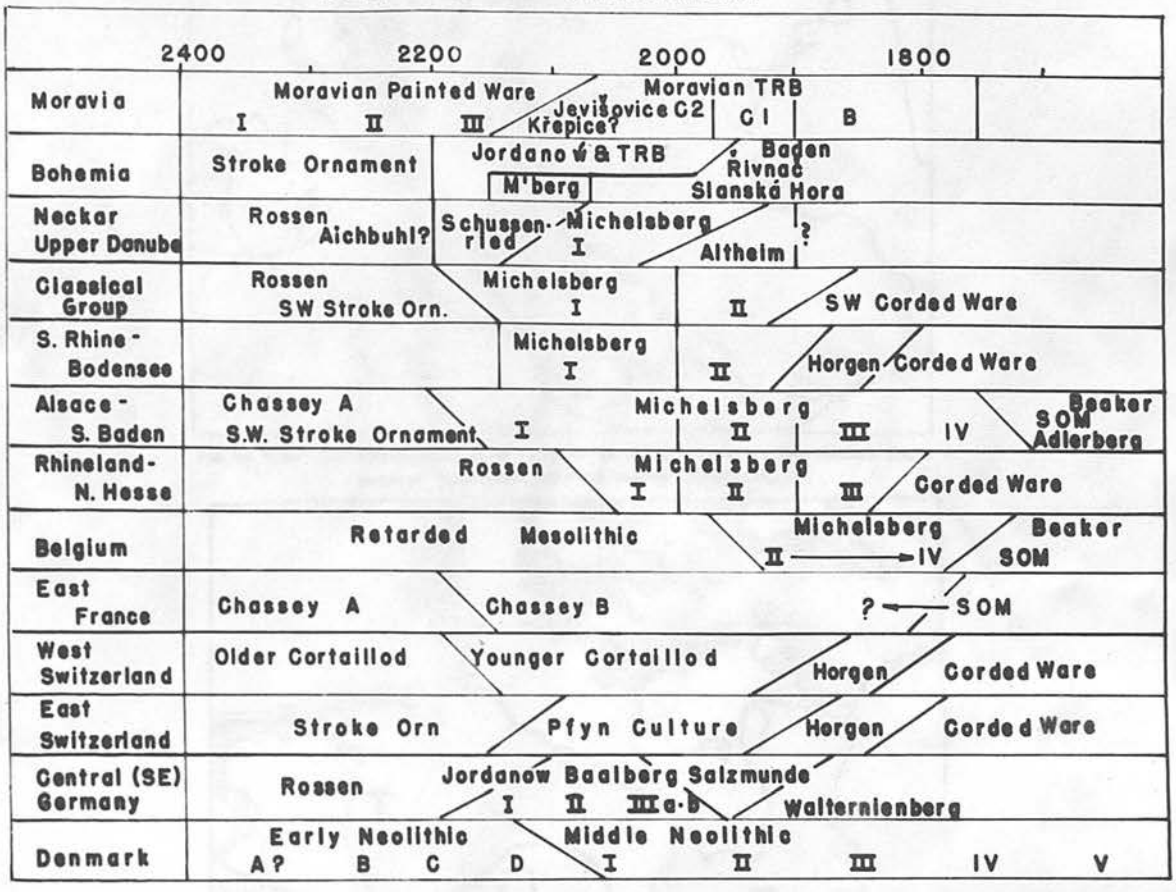

PHASE
GROUP
I
II
III
IV
A & C
A, C, SR & Bh
A, Be, Bh & R
Be & R
A, Be, C, R, SR
A, C, R, SR
A, C, R & Be
A, C, Bh, SR
All
A, C
C & R
C, SR
A, C, SR
A, C, SR
A, R, Be
A & C
A & R
A, Be, C, R
A, Be, C, R
A, C
A, C, R, SR
A, Be
A- Alsace, S. Baden
Be- Belgium
Bh- Bohemia
C- Classical Michelsberg
R- Rhineland, N. Hessen
SR- S. Rhine, Bodensee

Figure 65

RELATIVE CHRONOLOGY



(Note Scale Change)

C 14 CHRONOLOGY

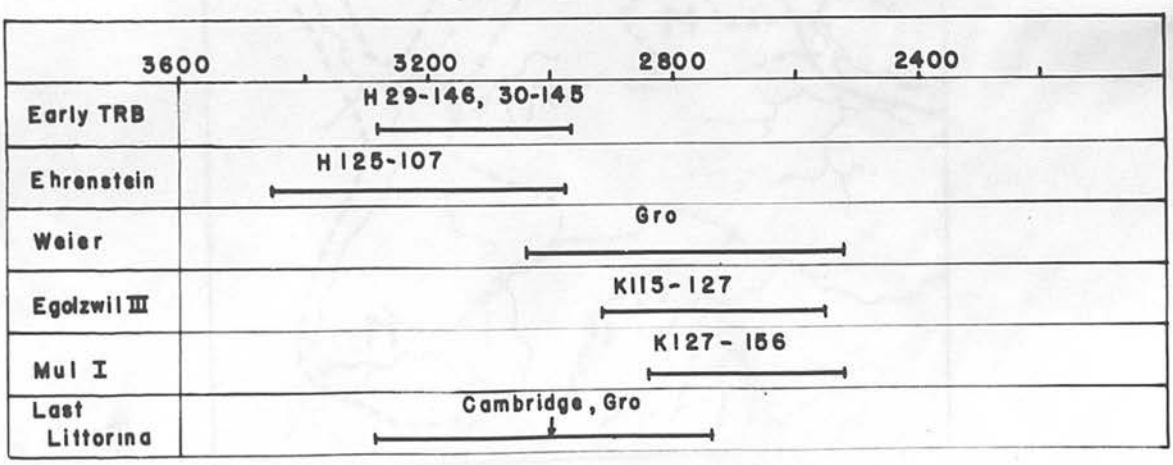


Figure 66

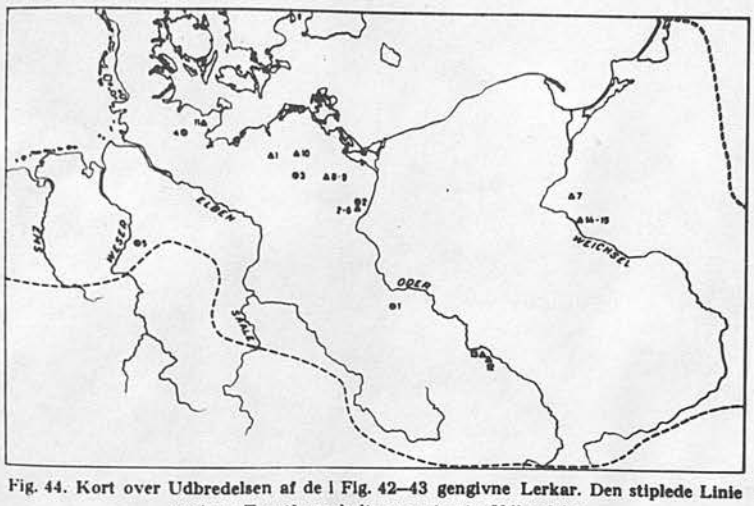


Fig. 44. Kort over Udbredelsen af de i Fig. 42–43 gengivne Lerkar. Den stiplede Linie angiver Tragtbægerkulturens største Udbredelse.

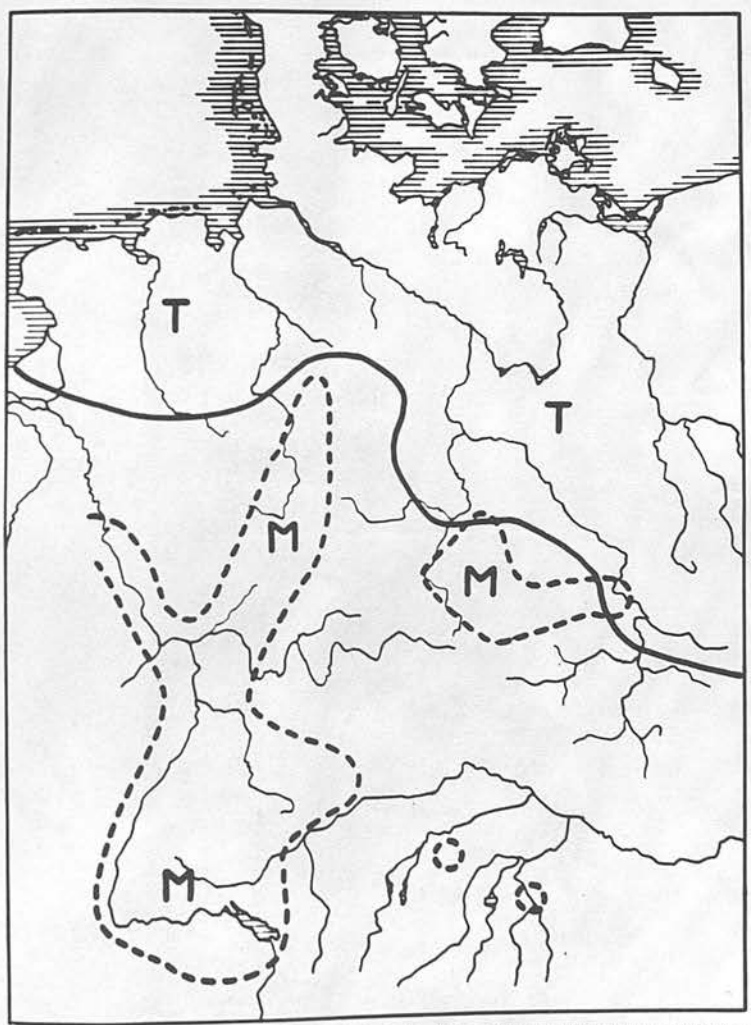


Abb. 6. Ungefähre Südgrenze der Trichterbecherkultur (T) nach Jazdzewski, Becker und Grimm. Gebiet der Michelsberger Kultur (M) nach den Angaben von Buttler.

Plate 2

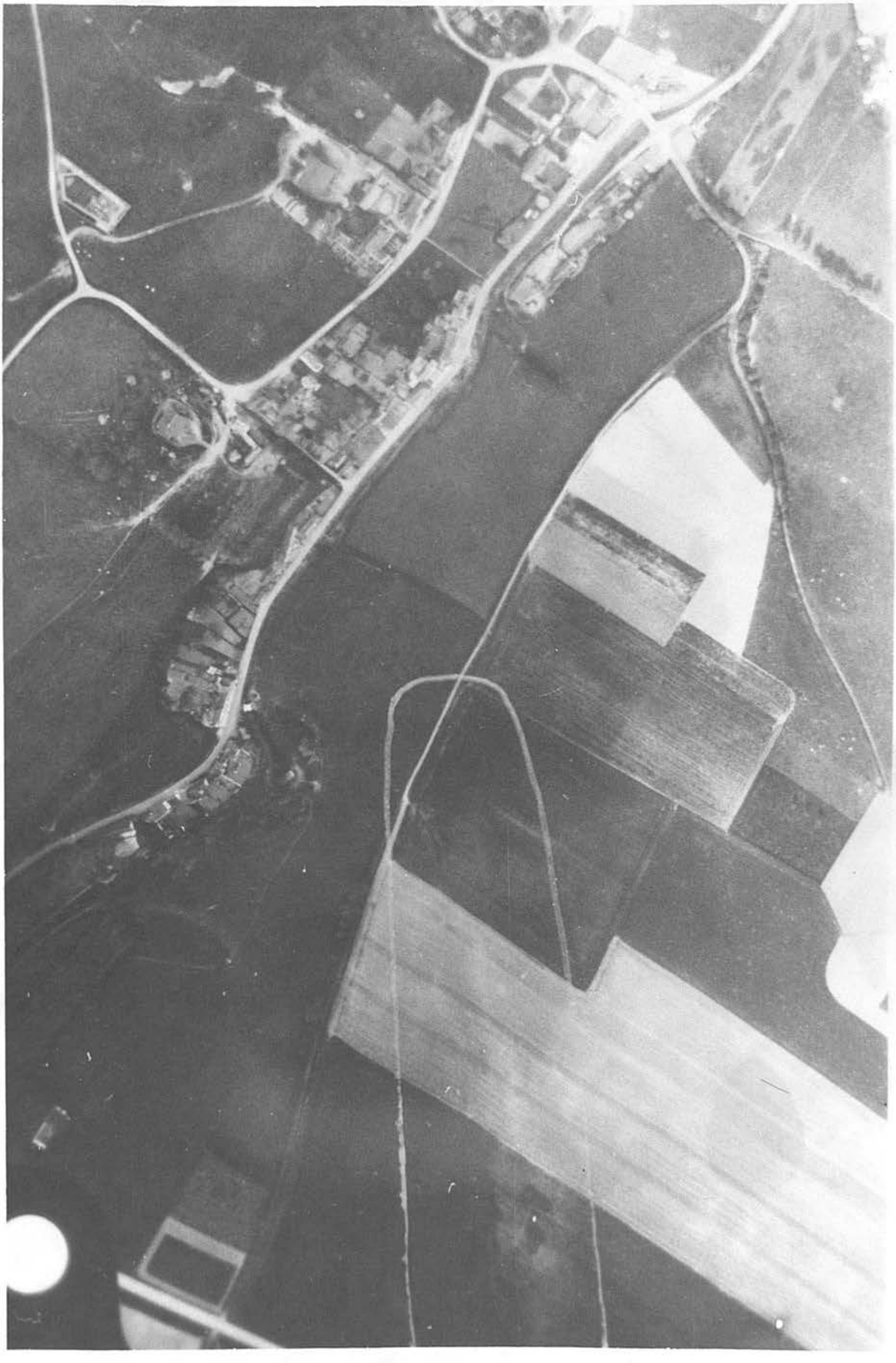


Plate 3

FORGERIES BY DE THISE

Plate 4

Plate 5

Plate 6

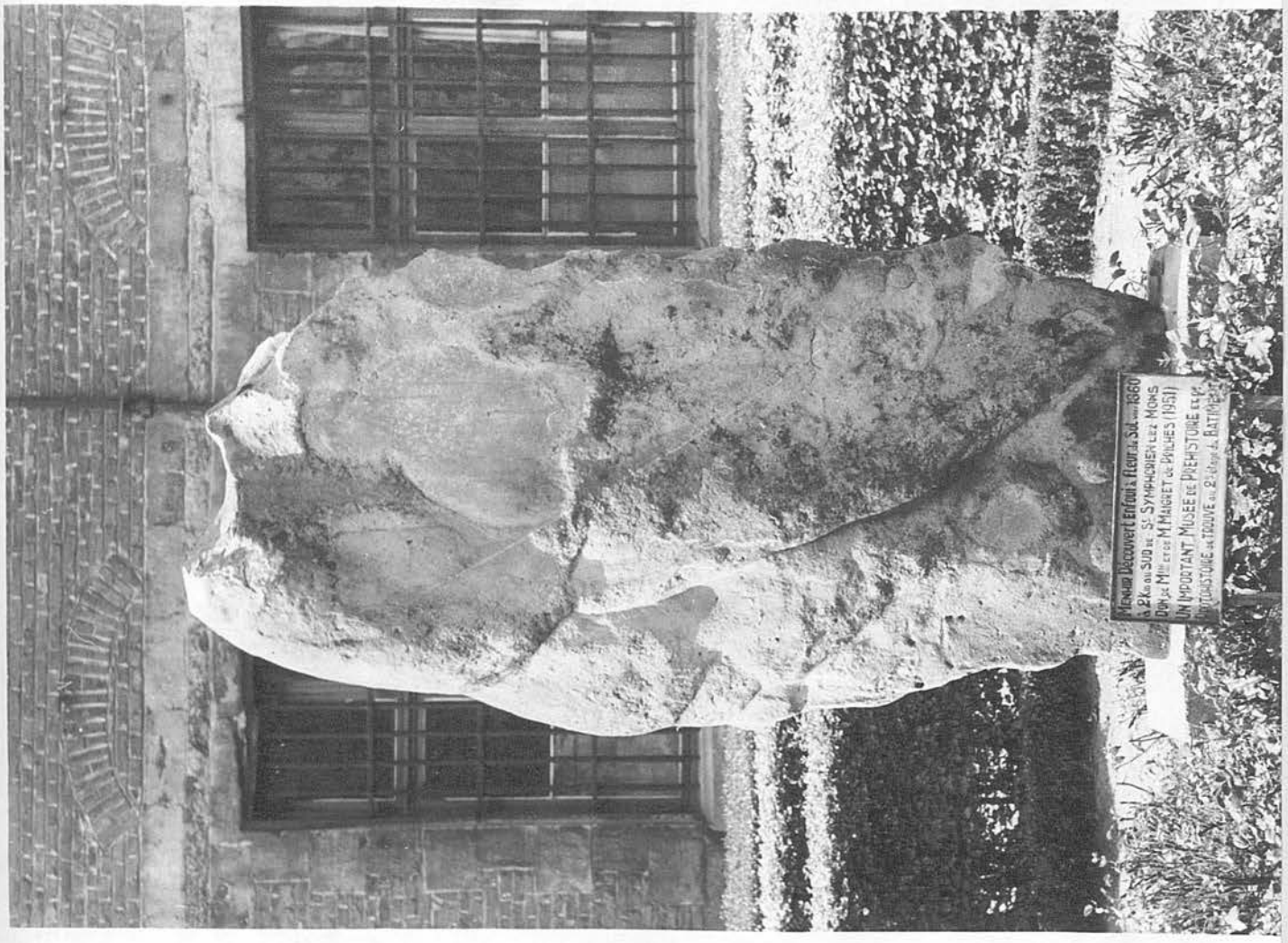

MENHIR Découvert Enfouis à Fleur de Sol en 1960
à 2 Km au SUD de St SYMPHORIEN lez MONS
DON de Mlle et de M. MARGET de POULHES (1951)
UN IMPORTANT MUSEE de PREHISTOIRE et de PROTOHISTOIRE se TROUVE au Rez de la BATTERIE

Plate 7