

Chronology and Evolution
within the Mesolithic of North-West Europe

Chronology and Evolution
within the Mesolithic of North-West Europe:
Proceedings of an International Meeting,
Brussels, May 30th-June 1st 2007

Edited by

Philippe Crombé, Mark Van Strydonck,
Joris Sergant, Mathieu Boudin and Machteld Bats

CAMBRIDGE
SCHOLARS

P U B L I S H I N G

Chronology and Evolution within the Mesolithic of North-West Europe:
Proceedings of an International Meeting, Brussels, May 30th-June 1st 2007,
Edited by Philippe Crombé, Mark Van Strydonck, Joris Sergeant,
Mathieu Boudin and Machteld Bats

This book first published 2009

Cambridge Scholars Publishing

12 Back Chapman Street, Newcastle upon Tyne, NE6 2XX, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Copyright © 2009 by Philippe Crombé, Mark Van Strydonck, Joris Sergeant, Mathieu Boudin
and Machteld Bats and contributors

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system,
or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or
otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-4438-1421-0, ISBN (13): 978-1-4438-1421-8

DEDICATION

In memory of our best friend and colleague
Marc Meganck
May 16th 1965 – May 31st 2007

TABLE OF CONTENTS

List of Illustrations	xv
List of Tables	xxv
Foreword	xxxi
Part I	1
The Pleistocene / Early Holocene Transition: Living in a Changing Environment	
Chapter One	3
Dating the Hamburgian in the Context of Lateglacial Chronology Mara-Julia Weber, Sonja B. Grimm	
Chapter Two	23
Éléments de paléohistoire autour du basculement Pléistocène-Holocène Boris Valentin	
Chapter Three	39
Les industries à grandes lames et éléments mâchurés du Paléolithique final du Nord de la France: une spécialisation fonctionnelle des sites Épi-ahrensbourgiens Jean-Pierre Fagnart	
Chapter Four	57
The Chronology of Early Mesolithic Occupation and Environmental Impact at Thatcham Reedbeds, Southern England Catherine Barnett	
Chapter Five	77
The Temporality of the Mesolithic Landscape: New Work at Star Carr Chantal Conneller, Nicky Milner, Tim Schadla-Hall, Barry Taylor	

Table of Contents

Chapter Six	95
Towards a Refinement of the Absolute (Typo) Chronology for the Early Mesolithic in the Coversand Area of Northern Belgium and the Southern Netherlands	
Philippe Crombé , Mark Van Strydonck, Mathieu Boudin	
Chapter Seven	113
Towards a Refinement of the Early Mesolithic Chronology in Sandy Flanders: a Technological Contribution	
Gunther Noens, Yves Perdaen, Caroline Ryssaert	
Chapter Eight	131
The Loshult Arrows: Cultural Relations and Chronology	
Lars Larsson	
Part II	141
Changing Patterns within the Mesolithic of North-West Europe	
Chapter Nine	143
A Radiocarbon Database for the Mesolithic and Early Neolithic in Northwest Europe	
Bernhard Weninger, Kevan Edinborough, Marcel Bradtmöller, Mark Collard, Philippe Crombé, Uwe Danzeglocke, Daniela Holst , Olaf Jöris, Marcel Niekus, Stephen Shennan, Rick Schulting	
Chapter Ten	177
Tracking Mesolithic Demography in Time and Space and its Implications for Explanations of Culture Change	
Felix Riede, Kevan Edinborough, Mark Thomas	
Chapter Eleven	195
Challenging Times: Reviewing Irish Mesolithic Chronologies	
Peter Woodman	

Chapter Twelve	217
Issues in Burial Chronology in the Mesolithic of Northwestern Europe	
Christopher Meiklejohn, Jeff Babb	
Chapter Thirteen	239
The Mesolithic site of Heffingen-Loschbour (Grand Duchy of Luxembourg). A yet Undescribed Human Cremation Possibly from the Rhine-Meuse-Schelde Culture: Anthropological, Radiometric and Archaeological Implications	
Michel Toussaint, Laurent Brou, Foni Le Brun-Ricalens, Fernand Spier	
Chapter Fourteen	261
A History of Mesolithic Occupation in the Belgian Campine Region	
Marijn Van Gils, Bart Vanmontfort, Marc De Bie	
Chapter Fifteen	277
The Stratified Early to Late Mesolithic Sequence at Trou Al'Wesse (Modave, Belgium)	
Rebecca Miller, John Stewart, Nicolas Zwyns, Marcel Otte	
Chapter Sixteen	297
Entre "effet réservoir" et "effet de plateau": la difficile datation du Mésolithique de Bretagne	
Grégor Marchand, Catherine Dupont, Christine Oberlin, Emmanuelle Delque-Kolic	
Chapter Seventeen	325
Mesolithic of Poitou-Charentes (France): Review of 15 Research Years	
Véronique Dujardin	
Chapter Eighteen	345
Éléments de chronologie absolue du Mésolithique dans le Nord de la France	
Thierry Ducrocq	
Chapter Nineteen	363
A Microlith Sequence from Friesack 4, Brandenburg, and the Mesolithic in Germany	
Birgit Gehlen	

Table of Contents

Chapter Twenty	395
Towards a New Chronology of the Late Mesolithic in Schleswig-Holstein	
Sönke Hartz	
Chapter Twenty-One	417
The Archipelago of Eastern Middle Sweden - Mesolithic Settlement in	
Comparison with ¹⁴ C and Shoreline Dating	
Roger Wikell, Fredrik Molin, Mattias Pettersson	
Chapter Twenty-Two	435
Stability and Change Among Marine Hunter-Fishers in Western Norway 7000-	
4500 cal BC. Results from the Excavations of Two Rockshelters in Hardanger	
Knut Andreas Bergsvik, Anne Karin Hufthammer	
Chapter Twenty-Three	451
Chronology and Evolution in the Mesolithic of the Upper Volga – Oka	
Interfluve	
Mikhail Zhilin	
Chapter Twenty-Four	473
Évolution récente du cerveau	
Jean-Georges Rozoy	
Part III	495
The Late Mesolithic and the Transition towards the Neolithic: Becoming	
Farmer	
Chapter Twenty-Five	497
The Mesolithic–Neolithic Transition in the Iron Gates, Southeast Europe:	
Calibration and Dietary Issues	
Gordon Cook, Clive Bonsall, Catriona Pickard, Kathleen McSweeney, László	
Bartosiewicz, Adina Boroneant	

Chapter Twenty-Six	517
Dietary Trends at the Mesolithic–Neolithic Transition in North-West Europe	
Clive Bonsall, Gordon Cook, Catriona Pickard, Kathleen McSweeney, László Bartosiewicz	
Chapter Twenty-Seven	541
The Relationship Between ^{14}C Content, $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ Values in Bone Collagen and the Proportion of Fish, Meat and Plant Material in the Diet: a Controlled Feeding Experiment	
Mark Van Strydonck, Anton Ervynck, Mathieu Boudin, Marina Van Bos, Roland De Wilde	
Chapter Twenty-Eight	557
Domestic Cattle and the Early Neolithic in Southern Scandinavia	
T. Douglas Price, Nanna Noe-Nygaard	
Chapter Twenty-Nine	573
An Evaluation of Palaeoecological Data as Evidence of Cultural Transition in the Final Mesolithic Millennium of Northern and North-Western Europe	
James Innes, Jeff Blackford	
Chapter Thirty	591
Late Mesolithic Environmental Change in the Upland Zone of Britain: High Resolution Records of Woodland Disturbance and Fire	
Peter Ryan, Jeff Blackford	
Chapter Thirty-One	615
Dating the Coastal Mesolithic of Western Britain: a Test of Some Evolutionary Assumptions	
Martin Bell, Sturt Manning, Nigel Nayling	
Chapter Thirty-Two	635
Times of Change: the Mesolithic and Mesolithic-Neolithic Transition in Northwest Ireland	
Graeme Warren	

Table of Contents

Chapter Thirty-Three	653
Time to Move on? The Late Mesolithic in the Lower Rhine Area as a Diverse Substrate for the Process of Neolithisation	
Luc Amkreutz	
Chapter Thirty-Four	671
The Evolution of Trapeze Industries and the Role of Armatures in Neolithisation Models for Northwest Europe: A Systematic Approach	
Erick Robinson	
Chapter Thirty-Five	693
'Occupation Continuity' and 'Behavioural Discontinuity': Abrupt Changes in Forager Land-use at the Mid/Late Atlantic Boundary in the Flevoland Polders (The Netherlands)	
Hans Peeters	
Chapter Thirty-Six	709
Developments in the Dutch Late Mesolithic: Landscape, Site Location, Subsistence and the Introduction of Pottery	
Daan Raemaekers, Marcel Niekus	
Chapter Thirty-Seven	727
Radiocarbon Dating of Pottery Food Crusts: Reservoir Effect or Not? The Case of the Swifterbant Pottery from Doel “Deurganckdok” (Belgium)	
Mathieu Boudin, Mark Van Strydonck, Philippe Crombé	
Chapter Thirty-Eight	747
Stone Mace-Heads and Picks: a Case-Study from The Netherlands	
Erik Drenth, Marcel Niekus	
Chapter Thirty-Nine	767
L’Occupation Mésolithique final du site de Lhéry dans la Marne	
Frédéric Séara, Françoise Bostyn	

Chronology and Evolution in the Mesolithic of North-West Europe

Chapter Forty	785
Les outils de broyage et polissage: des indicateurs chrono-culturels en contextes Mésolithiques et Rubanés en Europe nord-occidentale? Caroline Hamon	
List of Contributors	801

LIST OF ILLUSTRATIONS

Chapter One

Fig. 1-1: Distribution map of classic Hamburgian, Havelte Group and Hamburgian sites on the North European Plain.....	5
Fig. 1-2: Examples of classic Hamburgian shouldered point, shouldered point with bilateral retouch and Havelte tanged point	6
Fig. 1-3: Distribution of Hamburgian calibrated ^{14}C dates	14
Fig. 1-4: Calibration of the reliable ^{14}C dates of the Hamburgian (white line and grey background) divided into classic Hamburgian	14

Chapter Three

Fig. 3-1: Belloy-sur-Somme, <i>La Plaisance</i> . Remontage d'une série laminaire	44
Fig. 3-2: Belloy-sur-Somme, <i>La Plaisance</i> . Industrie lithique épi-ahrensbourgienne	45
Fig. 3-3: Carte des principaux gisements ahrensbourgiens ou épi-ahrensbourgiens du nord-ouest de l'Europe	47

Chapter Four

Fig. 4-1: Map of the Kennet Valley to show the distribution of Final Upper Palaeolithic and Mesolithic Sites	60
Fig. 4-2: Summary percentage pollen diagram for sequence TRA.....	63
Fig. 4-3: OxCal plots of (a.) The ^{14}C dates from floodplain sequence TRA and (b.) A comparison of a selection of the floodplain and terrace ^{14}C dates.....	65

Chapter Five

Fig. 5-1: Location of Star Carr.....	81
Fig. 5-2: Excavations at Star Carr.....	82
Fig. 5-3: Early Mesolithic sites around Lake Flixton	84
Fig. 5-4: Calibrated radiocarbon dates for Star Carr.....	87
Fig. 5-5: Calibrated radiocarbon dates for Star Carr.....	89

Chapter Six

Fig. 6-1: Microlith composition of the four Early Mesolithic assemblage types.....	100
--	-----

List of Illustrations

Fig. 6-2: Graphic representation of the 95% probability and the Quartile Interval for each individual assemblage type.....	105
Chapter Seven	
Fig. 7-1: Localisation of Verrebroek “Dok” and Doel “Deurganckdok”	117
Fig. 7-2: Schematic overview of the technological distinctiveness of the NVC-group and the O-group.....	120
Fig. 7-3: Doel “Deurganckdock”, sector J/L, C3.....	122
Fig. 7-4: Gent “Tweekerkenstraat”	125
Chapter Eight	
Fig. 8-1: The location of the Loshult find in southern Scandinavia.....	132
Fig. 8-2: Peat cutting in the bog Lilla Loshults mosse in 1951	133
Fig. 8-3: The best-preserved of the arrows from Loshult with the arrow-tip..	134
Fig. 8-4: The best preserved arrow-tip and the flints from Loshult used for arrowheads.....	135
Fig. 8-5: An X-ray photograph of the arrow-tip with the lump of resin and the two flints	135
Fig. 8-6: The Vinkel find of an arrow-shaft. After Troels-Smith 1962	136
Fig. 8-7: The radiocarbon dates of the Loshult arrows	138
Chapter Nine	
Fig. 9-1: CalPal-program dialog for radiocarbon database import	146
Fig. 9-2: Cumulative calibrated radiocarbon age distributions for selected countries from the NW-European Mesolithic-Neolithic database, in the age-range 11-4 ka calBP.....	156
Fig. 9-3: Cumulative calibrated radiocarbon age distributions for selected countries from the NW-European Mesolithic-Neolithic Database, in the age-range 12-7 ka calBP.....	157
Fig. 9-4: Tree-ring radiocarbon calibration curve.....	164
Fig. 9-5: Digital 3-D SRTM-Map showing the distribution of ¹⁴ C-dated sites for time-windows 10600- 9200 calBP.....	168
Fig. 9-6: Digital 3-D SRTM-Map showing the distribution of ¹⁴ C-dated sites for time-windows 9400 - 8000 calBP.....	169
Fig. 9-7: Digital 3-D SRTM-Map showing the distribution of ¹⁴ C-dated sites for time-windows 8200 - 7000 calBP.....	170

Chapter Ten

Fig. 10-1: Computer simulations of forager population sizes under different regimes of environmental productivity	180
Fig. 10-2: Mating distances plotted in relation to population density.....	181
Fig. 10-3: A: Plot of summed frequency distributions for all currently available Irish Mesolithic ¹⁴ C dates. B: Plot of the summed frequency distribution for the pooled mean of all dates for the same site/phase	183
Fig. 10-4: An ideal even distribution of 40 ¹⁴ C-dates with their calibration and sum	184
Fig. 10-5: A randomised distribution of 30 ¹⁴ C-dates around 6900 cal BP/5000 cal BC	186

Chapter Eleven

Fig. 11-1: Numbers of sites that produced radiocarbon dates in each decade and the numbers of radiocarbon dates obtained by each decade	199
Fig. 11-2: Location of sites referred to in text	200
Fig. 11-3: Schematic typological chart of the Irish Mesolithic.....	204
Fig. 11-4: Schematic chronological chart of key Irish Mesolithic radiocarbon dates	205

Chapter Thirteen

Fig. 13-1: The Loschbour rock-shelter, location of the site and the two different burials found in 1935	242
Fig. 13-2: The Loschbour rock-shelter, calibration of the three AMS dates available: top, the cremation; middle and bottom, the inhumation	244
Fig. 13-3: The Loschbour rock-shelter, external face of the Lb 11 fragment of the right parietal, displaying a dozen cut marks parallel to the squamosal suture	249

Chapter Fourteen

Fig. 14-1: Distribution of microlith findspots in the Campine region and their allocation to microregions	267
Fig. 14-2: Location of the Campine and other microregions	268
Fig. 14-3: Trends in microlith numbers per millennium, according to a logarithmic scale, in the Campine microregions.....	270
Fig. 14-4: Trends in microlith numbers per millennium in neighbouring microregions	271

List of Illustrations

Chapter Fifteen

Fig. 15-1: Trou Al'Wesse, site plan	279
Fig. 15-2: Map showing the principal Belgian Mesolithic sites by context....	281
Fig. 15-3: Trou Al'Wesse, stratigraphic sequence	284
Fig. 15-4: Trou Al'Wesse. Radiometric dates obtained for the Holocene sequence	285
Fig. 15-5: Map showing the principal Belgian Mesolithic sites by period	288
Fig. 15-6: Top: Decorated ceramic sherd from Trou Al'Wesse	291

Chapter Sixteen

Fig. 16-1: Carte des sites mésolithiques fouillés et datés sur le Massif armoricain (Bretagne, Pays-de-la-Loire, Basse-Normandie).....	299
Fig. 16-2: Projection sur la courbe de calibration atmosphérique des dates maximales des principaux sites du Mésolithique de Bretagne.....	304
Fig. 16-3: Stratigraphie du site mésolithique de Beg-an-Dorchenn.....	307
Fig. 16-4: Présentation des dates disponibles pour le Mésolithique et le Néolithique ancien en Bretagne et en Loire-Atlantique.....	316

Chapter Seventeen

Fig. 17-1: Map of the sites found by field walking by different researchers ..	328
Fig. 17-2: ¹⁴ C dating of Poitou-Charente Mesolithic sites	331
Fig. 17-3: Map of Europe indicating the sites where knives with basal notches were found	335
Fig. 17-4: Map of Poitou-Charentes indicating the sites where knives with basal notches were found.....	336

Chapter Eighteen

Fig. 18-1: Localisation des principaux sites étudiés	348
Fig. 18-2: Liste des datations avec leur calibration	351
Fig. 18-3: Assemblages microlithiques	354
Fig. 18-4: Assemblages microlithiques	358

Chapter Nineteen

Fig. 19-1: Aerial photographs with the sites of Friesack, northwest of Berlin	365
Fig. 19-2: Excavation plan of Friesack 4 with the different trenches plotted .	366
Fig. 19-3: The typo-chronological sequence of the microliths in Friesack 4, Trench Z	368

Fig. 19-4: The microlith assemblages from Duvensee, Bettenroder Berg IX, Jägerhaus cave and Rottenburg-Siebenlinden 1, 2 and 3 used in the correspondence analysis	369
Fig. 19-5: Typo-chronological sequence of the microlith inventories	374
Fig. 19-6: Phase 1, middle Pre-Boreal, from approx. 9000 cal BC.	375
Fig. 19-7: Phase 2, late Pre-Boreal, from approx. 8700 cal BC.....	376
Fig. 19-8: Phase 3, early Boreal, earlier part from approx. 8400 cal BC.....	378
Fig. 19-9: Phase 4, early Boreal, later part from approx. 8200 cal BC.....	379
Fig. 19-10: Phase 5, middle Boreal, from approx. 7800 cal BC	380
Fig. 19-11: Phase 6, late Boreal, from approx. 7200 cal BC	382
Fig. 19-12: Phase 7, late Boreal/early Atlantic - earlier Late Mesolithic from approx. 7000 cal BC	383
Fig. 19-13: Phase 8, early Atlantic - later Late Mesolithic from approx. 6100 cal BC	384

Chapter Twenty

Fig. 20-1: Ornamented antler base axe from Lübeck-Travemünde; Ornamented bone instrument from Travenort.....	398
Fig. 20-2: Ornamented antler base axe from Eckernförde-Möwenberg LA 29, large flint pick from Boelschuby LA 32; Slotted bone dagger fragment from Wangels LA 505; Replica with flint insets	399
Fig. 20-3: Map of site locations with late Maglemose and Kongemose materials in Schleswig-Holstein and Mecklenburg-Vorpommern	402
Fig. 20-4: Selected lithic assemblage from Loop LA 1 (late Maglemose Culture).....	403
Fig. 20-5: Selected lithic assemblage from Dreggers LA 6 (early Kongemose Culture).....	404
Fig. 20-6: Selected lithic assemblage from Bordesholm LA 1 (early Kongemose Culture).....	407
Fig. 20-7: Selected lithic assemblage from Seedorf LA 296 (middle Kongemose Culture).....	408
Fig. 20-8: Selection of bone and antler tools from Seedorf LA 296 (middle Kongemose Culture).....	411
Fig. 20-9 Selected lithic assemblage from Jäckelberg-Huk (middle Kongemose Culture).....	412
Fig. 20-10 Selected lithic assemblage from Stoltenberg LA 10 (late Kongemose Culture).....	413

List of Illustrations

Chapter Twenty-One

Fig. 21-1: Places and areas mentioned in the text.....	420
Fig. 21-2: The maps show the configuration of land, sea and ice in Sweden (A) and northern Europe (B) c. 8700 cal BC.....	421
Fig. 21-3: Plan and section of the sunken dwelling from Linköping.....	425
Fig. 21-4: Paleogeographic maps. Map B shows the Södertörn peninsula as it appeared c. 8.000-7.500 cal BC.....	427
Fig. 21-5: Shore-displacement curve for the Södertörn area near Stockholm	430

Chapter Twenty-Two

Fig. 22-1: The rockshelters Sævarhelleren and Olsteinhelleren	438
Fig. 22-2: ¹⁴ C-determinations from section walls at Sævarhelleren (SA) and Olsteinhelleren.....	439
Fig. 22-3: The coast of western Norway consists of numerous small and large islands.....	446

Chapter Twenty-Three

Fig. 23-1: ¹⁴ C dated sites in the forest zone of Eastern Europe	453
Fig. 23-2: ¹⁴ C dates of sites of Butovo culture.....	456
Fig. 23-3: Stanovoje 4, IV cultural layer	462
Fig. 23-4: Ivanovskoje 7, IV cultural layer	463
Fig. 23-5: A – Butovo, 1987 excavations; B – Stanovoje 4, cut 3, cultural layer III	465
Fig. 23-6: Stanovoje 4, cut 3, cultural layer III.....	466
Fig. 23-7: Stanovoje 4, cut 2, cultural layer III.....	467
Fig. 23-8: Okajomovo 5, cultural layer III.....	468
Fig. 23-9: Ivanovskoje 7, IIa cultural layer.....	469
Fig. 23-10: Ozerki 5, IV cultural layer	470

Chapter Twenty-Four

Fig. 24-1: Précocité du travail de l'os, du graphisme et de la parure dans la lignée du sapiens sapiens	477
Fig. 24-2: Mésolithique supérieur de Birmatten (Suisse), horizon 2.....	481
Fig. 24-3: Deux phénomènes interculturels	483
Fig. 24-4: La densité des sites à l'Épipaléolithique	484

Chapter Twenty-Five

Fig. 25-1: Age offset between paired human bone and ungulate bone points	505
--	-----

Fig. 25-2: Age offset between directly dated Mesolithic human bones and animal bone tools from Schela Cladovei, Romania.....	506
Fig. 25-3: Relationship between $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ for Late Mesolithic and Early Neolithic human bone collagen samples from Lepenski Vir	507
Fig. 25-4: Linear function of percentage aquatic diet versus $\delta^{15}\text{N}$ in human bone collagen.	508
Fig. 25-5: Comparison of corrected human bone ^{14}C ages and ^{14}C ages of bone artefacts made from terrestrial animal bones from Schela Cladovei, Romania.	511

Chapter Twenty-Six

Fig. 26-1: Carbon stable isotope results for Late Mesolithic and Neolithic humans from Scotland and Denmark.....	519
Fig. 26-2: Percentage contribution to carbon in collagen from energy sources	523
Fig. 26-3: $\delta^{13}\text{C}$ values for radiocarbon dated Late Mesolithic and Neolithic skeletons from coastal sites in Great Britain.....	529
Fig. 26-4: $\delta^{13}\text{C}$ values for radiocarbon dated Late Mesolithic and Neolithic skeletons from coastal sites in southern Scandinavia	530
Fig. 26-5: Variation in mean bone collagen $\delta^{13}\text{C}$ values for Neolithic populations in north-west Europe	534

Chapter Twenty-Seven

Fig. 27-1: PMC values compared to the changing composition of the diet	548
Fig. 27-2: $\delta^{13}\text{C}$ values compared to the changing composition of the diet	549
Fig. 27-3: $\delta^{15}\text{N}$ values compared to the changing composition of the diet	550
Fig. 27-4: Measured collagen $\delta^{13}\text{C}$ values compared to the theoretical values based on the diets ingredients and the trophic shift leve.....	551
Fig. 27-5: Measured collagen $\delta^{15}\text{N}$ values compared to the theoretical values based on the diets ingredients and the trophic shift level	552

Chapter Twenty-Eight

Fig. 28-1: Map of southern Scandinavia and northern Germany.....	560
Fig. 28-2: Plot of radiocarbon dates for samples of early domestic cattle from southern Scandinavia and northern Germany	561
Fig. 28-3: Skull of <i>Bos taurus domesticus</i> from the bog sacrifice site of Sandhuse on the island of Zealand, Denmark.....	565

List of Illustrations

Chapter Twenty-Nine

Fig. 29-1	582
-----------------	-----

Chapter Thirty

Fig. 30-1: Location map of Black Heath pollen site and the Marsden-Saddleshworth concentration of Mesolithic sites	594
Fig. 30-2: Black Heath low resolution diagram: selected pollen and charcoal	594
Fig. 30-3: Age-depth curve for Black Heath	602
Fig. 30-4: Black Heath high resolution diagram: selected pollen, fungi and charcoal.....	601
Fig. 30-5: Sites in the British Isles with 'early' cereal-type pollen (4900 – 4600 cal BC).....	607

Chapter Thirty-One

Fig. 31-1: Wales and adjoining areas of western Britain showing the location of the key sites discussed.	617
Fig. 31-2: The sedimentary sequence and dated sites at the edge of the former bedrock island at Goldcliff	619
Fig. 31-3: Dating the Lower Submerged Forest	624
Fig. 31-4: Dating the Lower Submerged Forest	625
Fig. 31-5: Dating the Upper Submerged forest at Goldcliff East	628

Chapter Thirty-Two

Fig. 32-1: Distribution map, showing main sites discussed in text.....	637
--	-----

Chapter Thirty-Three

Fig. 33-1: Longitudinal development of site complexes on the southern coversand landscape	658
Fig. 33-2: Combined counts for artefact and feature density per area per m ²	659
Fig. 33-3: Percentage counts for raw material composition of the lithic assemblage.....	662
Fig. 33-4: Ratio between flakes and blades per group.....	663
Fig. 33-5: Combined visual cluster analysis of the typological composition per group.....	663

Chapter Thirty-Four

Fig. 34-1: Study region and sites recorded	673
Fig. 34-2: Armature attributes mentioned in text.....	678
Fig. 34-3: Armature types discussed in the text.....	680
Fig. 34-4: Relative frequencies of armature types from the Lower Scheldt Late Mesolithic (n=327) and Hesbaye LBK (n=160)	681
Fig. 34-5: Relative attribute frequencies of armature from the Lower Scheldt Late Mesolithic (n=327) and Hesbaye LBK (n=160)	683

Chapter Thirty-Five

Fig. 35-1: The representation of Mesolithic life ways is often reduced to the static subdivision of camp types	696
Fig. 35-2: Chronological subdivision of archaeological phenomena.....	699
Fig. 35-3: Calibration plot (OxCal 3.10) of AMS dates from Hoge Vaart-A27	700
Fig. 35-4: Schematic representation of occupation/behavioural continuities (+: presence) and discontinuities (-: absence) at Hoge Vaart-A27	701
Fig. 35-5: Space/time matrix in relation to various dimensions of land-use...	703

Chapter Thirty-Six

Fig. 36-1: Map of the Netherlands showing the sites mentioned in the text...	710
Fig. 36-2: The shifting of the coastline and drowning of the landscape during the Early Holocene	713
Fig. 36-3: Scatterdiagram showing the association between uncalibrated ¹⁴ C dates (n=393) and the calculated elevation in metres above prehistoric sea level	714
Fig. 36-4: Sum probability plot of all 461 ¹⁴ C dates.....	717
Fig. 36-5: Sum probability plot of 202 combined 14C dates.....	718
Fig. 36-6: Find categories from the Late Mesolithic	720

Chapter Thirty-Seven

Fig. 37-1: Plot of radiocarbon dates.....	735
Fig. 37-2: Sum probability of food crusts and organic material	736
Fig. 37-3: Stable isotopes plot of food crusts	739
Fig. 37-4: Sum probability of food crusts, organic material and cremated mammal bones.....	739

List of Illustrations

Chapter Thirty-Eight

Fig. 38-1: Map of the Netherlands with the provinces situated north of the river Rhine.....	749
Fig. 38-2: Several examples of perforated mace-heads (nrs. 1 & 2), a pick (nr. 3) and cupped pebbles (nrs. 4-6).....	751
Fig. 38-3: Scatter plot showing the relation between the weight of perforated mace-heads and picks	752
Fig. 38-4: Scatter plot showing the cases along the first two PCA-axes	753
Fig. 38-5: Stacked bar graph showing the percentages of mace-heads and picks for several Dutch provinces	754
Fig. 38-6: One of the pits excavated in Rotterdam with the perforated mace-head <i>in situ</i>	761

Chapter Thirty-Nine

Fig. 39-1: Plan de distribution des amas de débitage.....	770
Fig. 39-2: Nucléus à lamelles	773
Fig. 39-3: Remontage R50 associant plusieurs ensembles de débitage à lamelles	775
Fig. 39-4: Remontage R2, intégrant une pièce esquillée ayant servie à la fracturation des dalles de silex.....	776
Fig. 39-5: Pièce esquillée du remontage R2	777
Fig. 39-6: Remontage R116 confirmant la pratique systématique de la fracturation des dalles en petits ensembles de débitage.....	778
Fig. 39-7: Armatures triangulaires à retouches inverses plates dérivées des trapèzes et trapèzes	779
Fig. 39-8: Schéma opératoire synthétique de production lamellaire.....	783

Chapter Forty

Fig. 40-1: Echantillon d'outils de broyage sur plaque du site Mésolithique ancien de Verrebroek (Flandres, Belgique)	790
Fig. 40-2: Echantillon de galets-lissoirs et de galets de percussion utilisés à Verrebroek (Flandres, Belgique)	794

LIST OF TABLES

Chapter One

Table 1-1: Acceptable dates of sites associated with the Hamburgian	13
---	----

Chapter Four

Table 4-1: Floodplain sequence TRA ¹⁴ C determinations	64
Table 4-2: Previous ¹⁴ C determinations for Thatcham Reedbeds	66

Chapter Five

Table 5-1: List of radiocarbon data for Star Carr	87
---	----

Chapter Six

Table 6-1: Excavated sites and radiocarbon dates listed according to dating material from Sandy Flanders in north-west Belgium	99
Table 6-2: Radiocarbon dates on carbonised hazelnut shells according to assemblage type	103
Table 6-3: 95% probability and Quartile Interval for each individual assemblage type	103

Chapter Seven

Table 7-1: The lithic scatters submitted to a technological analysis and their associated radiocarbon dates.....	117
Table 7-2: Simplified typological composition of the different lithic scatters	119

Chapter Nine

Table 9-1: Synonyms used for MATERIAL	145
Table 9-2: ¹⁴ C-Data counted under MATERIAL	148
Table 9-3: ¹⁴ C-Data counted under COUNTRY	149
Table 9-4: ¹⁴ C-Data counted under COUNTRY AND MATERIAL	152
Table 9-5: ¹⁴ C-Data counted under SPECIES	153
Table 9-6: ¹⁴ C-dated Mesolithic hazelnut roasting sites, Duvensee	162
Table 9-7: Calendric and ¹⁴ C-Scale Intervals used in Mapping	165

List of Tables

Chapter Twelve

Table 12-1: Distribution of sites and burial types	219
Table 12-2: Distribution of burials on sites	221
Table 12-3: Distribution of variables by location	222

Chapter Fourteen

Table 14-1: Size of the microregional datasets from the Campine area	266
--	-----

Chapter Fifteen

Table 15-1: Cave and rock shelter sites dating to the Middle Mesolithic	283
Table 15-2: Trou Al'Wesse. Tool frequencies by stratum and facies	287

Chapter Sixteen

Table 16-1: Corpus de datations par le radiocarbone du premier Mésolithique sur le Massif armoricain	303
Table 16-2: Corpus de datations par le radiocarbone du second Mésolithique	313

Chapter Seventeen

Table 17-1: ¹⁴ C dating of Poitou-Charente Mesolithic sites	333
--	-----

Chapter Eighteen

Tableau 18-1: décompte des spectres microlithiques des principaux sites datés entre 9500 BP et 8000 BP.....	352
---	-----

Chapter Twenty

Table 20-1: Old chronological sequence of the Late Mesolithic in Schleswig-Holstein.....	400
Table 20-2: New chronological sequence of the Late Mesolithic in Schleswig-Holstein and Denmark	400

Chapter Twenty-Two

Table 22-1: Archaeological material from rockshelters Sævarhelleren 22x 55y, layers E and G and Olsteinhelleren 24x 50y layers D and E	440
Table 22-2: Faunal material from rockshelters Sævarhelleren 22x 55y, layers E and G and Olsteinhelleren 24x 50y layers D and E	442

Chapter Twenty-Three

Table 23-1: List of radiocarbon dates from the Mesolithic site of Stanovoje 4.....	454
Table 23-2: List of radiocarbon dates from the Mesolithic site of Ivanovskoye 7	455
Table 23-3: List of radiocarbon dates from the Mesolithic site of Sahtysh 14	457
Table 23-4 : List of radiocarbon dates from the Ozerki peat bog	458
Table 23-5: list of radiocarbon dates from the Dubna peat bog	459

Chapter Twenty-Five

Table 25-1: Stable isotope values for AMS ^{14}C dated archaeological human remains from the Iron Gates	502
Table 25-2: Correction of Lepenski Vir Late Mesolithic and Early Neolithic human bone Ages for Reservoir Effect (RE)	509
Table 25-3: Corrected Lepenski Vir Late Mesolithic and Early Neolithic human bone ages and stable isotope values in chronological order	509
Table 25-4: Comparison of uncorrected and corrected human bone ^{14}C ages with ^{14}C ages for associated ungulate bone projectile points from Schela Cladovei, Romania	510

Chapter Twenty-Six

Table 26-1: Predicted human bone collagen $\delta^{13}\text{C}$ values for a range of hypothetical diets	522
Table 26-2: Stable isotope values of the main dietary components and the diet–collagen enrichments used in the revised partial routing model employed in this paper	524
Table 26-3: Hypothetical daily ‘Neolithic’ diet based on terrestrial food sources	525
Table 26-4: Composition of hypothetical diets with varying amounts of marine protein.....	525
Table 26-5: Predicted human bone collagen $\delta^{13}\text{C}$ values for a series of hypothetical diets with varying proportions of protein from major food sources	526

Chapter Twenty-Seven

Table 27-1: Radiocarbon content, stable isotope measurements and the amount of proteins in the basic components of the diets	545
--	-----

List of Tables

Table 27-2: The composition of the 12 diets made out of the 3 primary products, and additives	545
Table 27-3: Derivation of protein within the 12 diets.....	546
Table 27-4: Table 27-4: Radiocarbon and stable isotope data from the collagen of the chicken bones.	547
Table 27-5: Comparison between the theoretical and observed ¹⁴ C activity of the collagen in relation to the composition of the diet	550

Chapter Thirty

Table 30-1: Description of the stratigraphy of the Black Heath monolith	599
Table 30-2: Radiocarbon determinations and calibrations for Black Heath ...	599
Table 30-3: Description of Black Heath high resolution diagram subzones...	600
Table 30-4: Pollen and coprophilous fungi response to burning indicators and fire return frequency	601

Chapter Thirty-One

Table 31-1: Radiocarbon dates for Mesolithic coastal sites in Western Britain	621
---	-----

Chapter Thirty-Two

Table 32-1: Radiocarbon Dates from Belderrig; all dates cited at 95% confidence.....	645
--	-----

Chapter Thirty-Seven

Table 37-1: Analysed food crusts	734
Table 37-2: Quartile interval of food crusts and organic material	735
Table 37-3: Radiocarbon dated food crusts and organic material.....	737
Table 37-4: Weight after pre-treatment and radiocarbon dates of cremated bones and yielded carbon after graphitisation	738
Table 37-5: Sum probability of food crusts, organic material and cremated mammal bones.....	740

Chapter Thirty-Eight

Table 38-1: Relationship between shape and type of the (nearly) complete mace-heads and picks	750
---	-----

Chapter Forty

Tableau 40-1: Types d'outils identifiés à partir d'un échantillon du site Mésolithique ancien de Verrebroek (Flandres, Belgique)	787
Tableau 40-2: Description succincte des plaques et outils de broyage étudiés à Verrebroek (Flandres, Belgique).....	789
Tableau 40-3: Description succincte des galets de percussion et de lissage étudiés à Verrebroek (Flandres, Belgique)	793

