

Classification of Lithic Artefacts from the British Late Glacial and Holocene Periods

Torben Bjarke Ballin

ARCHAEOPRESS ARCHAEOLOGY



ARCHAEOPRESS PUBLISHING LTD

Summertown Pavilion

18-24 Middle Way

Summertown

Oxford OX2 7LG

www.archaeopress.com

ISBN 978-1-78969-869-5

ISBN 978-1-78969-870-1 (e-Pdf)

© Torben Bjarke Ballin and Archaeopress 2021

Front cover: Levallois-like flint core from Stoneyhill Farm (photo: Beverley Ballin Smith), Aberdeenshire

Back cover: Conical microblade core of pitchstone from Colinhill, South Lanarkshire (photo: Beverley Ballin Smith)

This book is available in print and as a free download from www.archaeopress.com



This work is licensed under a Creative Commons
Attribution-NonCommercial-NoDerivatives 4.0 International License

Contents

Contents	i
List of Figures	ii
Acknowledgements	vi
Preface	vii
Classification and characterisation of lithic artefacts	1
The background to and aims of the present volume.....	1
Chronology	2
Basic descriptive terminology	6
The main elements of flakes and blades	6
Main percussion techniques and technological attributes	7
Percussion angle	9
Reduction sequence.....	9
Type of retouch	9
Orientation of retouch	10
Morphology of retouch.....	10
Angle of retouch.....	10
Delineation of retouch	10
The typology of lithic debitage, cores and tools	12
Debitage.....	12
Core preparation flakes.....	13
Cores	14
Formal tools	24
Arrowheads.....	24
Tanged arrowheads	24
Curve-, angle-, and straight-backed points	25
Leaf-shaped arrowheads.....	26
Chisel-shaped and oblique arrowheads	27
Barbed-and-tanged arrowheads.....	28
Microliths and microlith-related pieces	32
Crescents	35
Scrapers.....	41
Piercing implements	46
Knives	51
Other bifacial cutting implements.....	59
Burins	62
Fire-making implements	65
Rods (LN and BA)	67
Polished-edge implements.....	67
Pieces with one or more notches	68
Combined tools	70
Pieces with other retouch	71
Flint axeheads	71
Tribrachs	78
Tools used to produce the lithic assemblages (see Inizan et al. 1992)	78
Bibliography	80

List of Figures

Table 1:	Basic chronological schema for Britain's early prehistory. The dates for Scotland are mainly based on dates from the various Scottish research framework panel reports. The post Mesolithic dates for England are based on Historic England's period list, and the LUP dates for England are based on Pettitt (2008) and calibrated by the author using the calibration software OxCal 4.3.....	3
Figure 1:	Hierarchical classification system covering British lithic types.....	4
Figure 2:	Descriptive database form.....	6
Figure 3:	The main elements of flakes and blades – terminology and orientation	8
Figure 4:	Four refitted orange-segment flakes and bipolar cores from the Norwegian site Lundevågen 21, SW Norway: 1) Refitted and 2) 'exploded' view.....	8
Figure 5:	The elements of a bipolar orange-segment flake; the thick line indicates cortex.....	9
Figure 6:	Metrically defined debitage categories.....	12
Figure 7:	Crested pieces: 1) A bilaterally crested piece – GD= 93mm; and 2-3) unilaterally crested pieces - GD = 17-28mm, all from Milltimber Zone 4, Aberdeenshire The former piece is thought to date to the LUP and the latter two are likely to be Late Mesolithic.....	13
Figure 8:	Platform rejuvenation flakes: 1) A full platform rejuvenation flake from Milltimber Zone 4, Aberdeenshire – GD = 52mm; and 2) a partial platform rejuvenation flake from Garthdee Road, Aberdeen – GD = 36mm.....	14
Figure 9:	A raw quartz pebble and split quartz pebbles from RUX6, North Uist, Western Isles.....	15
Figure 10:	A selection of split pebbles of quartz from RUX6, North Uist, Western Isles.....	15
Figure 11:	Two en éperon blades from Howburn, South Lanarkshire – GD = 29-31mm	16
Figure 12:	Core rough-outs: 1) A specimen from Garthdee Road, Aberdeen – GD = 30mm; and 2) one from Standingstones, Aberdeenshire – GD = 36mm.....	16
Figure 13:	Single-platform cores: 1) Broad conical core from Barabhas, Lewis - GD = 62mm; and 2) slender conical core from Colinhill, South Lanarkshire – GD = 29mm. The former has a cortical platform and probably dates to the Late Neolithic/Early Bronze Age period, whereas the latter has a plain platform with an abraded edge and it is thought to be Early Neolithic.....	17
Figure 14:	A selection of typical Late Mesolithic conical single-platform cores from Milltimber Zone 5, Aberdeenshire. The upper two cores display scars from short hinge- and step-terminating flakes or blades, which may be the reason why they were abandoned.....	17
Figure 15:	Handle-cores: 1) Well-defined handle-core from Nørholm, Denmark – GD 92mm; and 2) a less sophisticated Scottish handle-core from Garthdee Road, Aberdeen – GD = 39mm. Notice the keel running along the rear of the Danish handle-core.....	18
Figure 16:	Opposed-platform cores: 1) Large Hamburgian opposed-platform core from Howburn, South Lanarkshire – GD = 40mm; and 2-4) three small Late Mesolithic opposed-platform cores from Nethermills Farm, Aberdeenshire – GD = 27-33mm.....	19
Figure 17:	Core with two platforms at an angle from Garthdee Road, Aberdeen – GD = 44mm.....	19
Figure 18:	Irregular core from Kilmelfort Cave, Highland – GD = 24mm.....	20
Figure 19:	Plain discoidal core from Carnoustie, Angus – GD = 45mm.....	20
Figure 20:	Kombewa core/'flaked flake' from Hoxne Lower, Suffolk – GD = 110mm. Hoxne is a Lower Palaeolithic location – this figure has been used as few drawings exist of these simple cores from later sites.....	21
Figure 21:	Bifacial discoidal core from Raunds, Northamptonshire – GD = 30mm.....	21
Figure 22:	Discoidal core of Glen Luce Type: 1) Schematic illustration of a discoidal core of Glen Luce Type; and 2) a specimen from Biggar, South Lanarkshire – GD = 35mm.....	21
Figure 23:	The operational schema of the Late Acheulean / Mousterian Levalloisian : I. Basic shaping of nodule; II. preparation of domed dorsal surface; III. preparation of faceted striking platform on core; IV. the flake and the struck core, with their characteristic features. Drawn by the late M.H.R. Cook/courtesy of Derek Roe.....	21
Figure 24:	Levallois-like cores: 1) A specimen from Wester Clerkhill, Aberdeenshire – GD = 63mm; and 2-3) two from Wester Hatton, Aberdeenshire – GD = 33-40mm.....	22
Figure 25:	Levallois-like core from Stoneyhill Farm, Aberdeenshire.....	22
Figure 26:	Probably Mesolithic bipolar cores from Nethermills Farm, Aberdeenshire – GD = 13-32mm	23
Figure 27:	Probably Early Bronze Age bipolar cores from Freshwater West, Pembrokeshire – GD = 30-41mm.....	23
Figure 28:	Hamburgian shouldered and tanged points: 1) An Early Hamburgian shouldered point from Bjerlev in central Jutland, Denmark – GD 43mm; 2) an intact Late Hamburgian tanged point from Howburn, South Lanarkshire – GD = 42mm; and 3-5) a number of tang fragments from Havelte points, showing the distinct 'notch-and-spur' feature – GD = c. 14mm.....	24
Figure 29:	Ahrensburgian tanged points: 1) A specimen from Balevullin, Tiree; and 2) one from Shildaig, Loch Torridon, Highland.....	25
Figure 30:	Single-edged tanged points: 1) The single-edged point from Brodgar, Orkney – the ventral chipping at the tip may represent impact damage; and 2) for comparison, a similar Fosna-Hensbacka point from Källered in western Sweden.....	25
Figure 31:	Creswellian backed points from Hoyle's Mouth, Pembrokeshire – GD = 36-60mm.....	26

Figure 32:	Federmesser points: 1-4) Typical Federmesser points from Nanna's Cave and Potter's Cave, Caldey Island, Pembrokeshire, and King Arthur's Cave, Herefordshire – GD = 15-45mm; 5) typical Federmesser point from Howburn, South Lanarkshire – GD = 22mm; and 6-9) other less diagnostic backed points from Kilmelfort Cave, Argyll – GD = 27-41mm	27
Figure 33:	Green's size and shape categories. These types are based on Principal Components Analysis. It was chosen to select drop-shaped examples for this illustration, but the types shown here also occur as double-pointed, kite-shaped and ogival pieces.	27
Figure 34:	Leaf-shaped arrowheads: 1-5) Drop-shaped, double-pointed, and kite-shaped leaf-shaped points from Elgin Museum in Moray – GD = 20-35mm; and 6) ogival point from Auchategan in Argyll – GD = 31mm.....	28
Figure 35:	Clark's 10 main PTD forms. Types E and F have been rotated to bring their orientation into line with present consensus on their likely hafting form. Re-drawn by the author from Clark.	28
Figure 36:	PTDs from sites near Overhowden Henge, Scottish Borders : 1) Chisel-shaped arrowheads; and 2) oblique arrowheads.....	29
Figure 37:	'Long-tailed obliques': 1) A specimen from Santon Warren, Norfolk; and 2) one from Marden Henge, Wiltshire.	29
Figure 38:	Green's barbed-and-tanged arrowhead typology.	29
Figure 39:	'Fancy' barbed-and-tanged arrowheads: 1) Conygar point from Rudstone in Yorkshire; 2) Green Low point from Lambourn Down in Berkshire; and 3) Kilmarnock point from Aberdeenshire – GD = 35-45mm.	30
Figures 40-41:	A selection of barbed and tanged arrowheads: 40) Common Sutton Type points from Elgin Museum in Moray – GD = 18-30mm; and 41) barbed-and-tanged arrowhead blanks, half-finished broken pieces, and slightly 'wonky' specimens from an arrowhead workshop at Dalmore on Lewis – GD = 17-53mm; Nos 5 and 7 are defined by their triangular tangs as Kilmarnock points.	31
Figure 42:	Seriation of BAT sub-types in relation to pottery styles.....	31
Figure 43:	Hollow-based arrowhead from Stackpole, Pembrokeshire – GD = 34mm.....	31
Figure 44:	The production of microlith preforms by the application of microburin technique. The approach furthest right is referred to as the lamelle a cran approach; if the microburin facet of the distal part was not modified but left sharp, this piece would be referred to as a 'Krukowski microburin', but most Krukowski 'microburins' are either microlith preforms, pieces broken during modification or pieces used as scalene triangles without modification of the proximal microburin facet.	32
Figure 45:	Microlith preforms: 1-9) Specimens from Nethermills Farm, Aberdeenshire – GD = 15-39mm; and 10-11) from Milltimber Zone 5, Aberdeenshire – GD = 11-19mm.	33
Figure 46:	Obliquely blunted points from Donich Park, Argyll & Bute – GD = 14-19mm.	33
Figure 47:	Isosceles triangles from Nethermills Farm, Aberdeenshire – 9.6-23mm. Notice the isosceles micro-triangle furthest to the right, which may be Late Mesolithic.	34
Figure 48:	Trapezoid microliths from Lussa Bay, Jura, Highland – GD = 23-33mm.	34
Figure 49:	Scalene triangles: 1-4) large, broad scalene triangles from Nab Head I, Pembrokeshire – GD = c. 30mm; 5-9) small, narrow scalene triangles from Prestatyn, Clwyd – GD = 14-18mm; and 10-14) small, narrow, extremely long scalene triangles from Milltimber Zone 5, Aberdeenshire – GD = 11-21mm. Comparison with north-west European/Scandinavian typo-chronology suggests that the different forms of British scalene triangles may represent a chronological sequence.	35
Figure 50:	Chronological sequence of triangular microliths in southern Scandinavia and northern Germany, with No. 1 dating to what in Britain is referred to as the Early Mesolithic, No. 2 to the early part of the Late Mesolithic, and No. 3 to the later part of the Late Mesolithic.....	35
Figure 51:	Early and early Late Mesolithic microlith assemblages from Duvensee Moor in Schleswig-Holstein. They were sequenced by Bokelman on the basis of the lithic material and analysis of the sites' context and stratigraphy. The dates, which were kindly provided by Sönke Hartz, Curator at Schloss Gottorff, Schleswig-Holstein, have been calibrated by the author by applying the OxCal 4.3 software. The microlith illustrations were kindly provided by M. Reynier, London Higher.	36
Figure 52:	Crescents: 1-3) Specimens from Milltimber Zone 5, Aberdeenshire – GD = 22-28mm; and 4-9) from Nethermills Farm, Aberdeenshire – GD = 14-35mm.	37
Figure 53:	Edge-blunted microliths: 1-2) Specimens from Dunragit, Site 19, Dumfries & Galloway – GD = 25-26mm; and 3-6) from Nethermills Farm, Aberdeenshire – GD = 22-24mm	37
Figure 54:	Quadrilateral microliths from North Carn, Jura, Highland – GD = 13-21mm.....	38
Figure 55:	Basally modified microliths: 1-8) Horsham points – GD = 20-30mm; and 9-14) Honey Hill points – GD = 20-28mm.	38
Figure 56:	1-9) Micro petit tranchets from White Gill, Yorkshire; and 10–15) Penpant, Pembrokeshire.....	39
Figure 57:	Zonhoven points from Zonhoven-Molenheide, Belgium – GD = 16-36mm.	40
Figure 58:	Backed and truncated bladelets: 1-3) Three backed bladelets from St Catherine's Bridge, Pembrokeshire – GD = 12-16mm; and 4) one obliquely blunted bladelet from Nethermills Farm, Aberdeenshire – GD = 25mm.	40
Figure 59:	Four proximal and one distal microburins from Milltimber Zone 5, Aberdeenshire – GD = 8-18mm.	41
Figure 60:	Scraper-edge angles – LUP blade-scrappers and short end-scrappers from Howburn compared to Middle Bronze Age short end-scrappers from Bayanne, Yell.....	41
Figure 61:	Thumbnail-scrappers: 1-5) Typical Early Bronze Age thumbnail-scrappers from Elgin Museum, Moray; L = c. 15-20mm; and 6-8) from Freshwater West, Pembrokeshire – GD = 16-19mm.	42
Figure 62:	Typical thumbnail-sized scrapers from Mesolithic contexts: 1) A specimen from Early Mesolithic An Corran, Highland; GD = 25mm; and 2) one from Early/Late Mesolithic Nethermills Farm, Aberdeenshire; GD = 19mm.	42
Figure 63:	Discooidal scrapers: 1) Possibly LUP discooidal scraper from Kilmelfort Cave, Highland – GD = 20mm; and 2) EBA discooidal thumbnail-scraper from Bryn-y-Mor, Pembrokeshire – GD = 19mm.	43
Figure 64:	A selection of Hamburgian short end-scrappers and blade-scrappers from Howburn, South Lanarkshire – GD = 21-46mm; note that the blanks of the blade-scrappers are Levallois-like blades.....	43

Figure 65:	A selection of Mesolithic short end-scrapers and blade-scrapers from Nab Head, Site I, Pembrokeshire – GD = 21-47mm.....	44
Figure 66:	A selection of scrapers from North Carnaby Temple Site 9, Carnaby Top Site 12 and Flamborough Site 3, Yorkshire – GD = 26-74mm (Manby 1974: Figures 10, 24 and 31; artist: T.G. Manby; courtesy of T.G. Manby.....	44
Figure 67:	A selection of Early Bronze Age short end-scrapers from Freshwater West, Pembrokeshire – GD = 16-30mm; most of these scrapers appear to be based on bipolar flakes or abandoned bipolar cores.....	45
Figure 68:	Double-scrapers: 1) A specimen from Howburn, South Lanarkshire – GD = 39mm; and 2) one from Nethermills Farm, Aberdeenshire – GD = 25mm.....	46
Figure 69:	Side-scrapers from An Corran, Skye – GD = 50mm.	46
Figure 70:	The formal distinction between end- and side-scrapers. The dots mark the position of the bulb-of-percussion. .	47
Figure 71:	Northern Irish hollow scraper – GD = 38mm.	47
Figure 72:	Flake- or blade-based plain piercers: 1) Flake-based piercer from Nethermills Farm, Aberdeenshire – GD = 29mm; 2) short blade-based piercer from Milltimber Zone 3, Aberdeenshire – GD = 24mm; and 3) longer blade-based piercer from Gough’s Cave, Somerset – GD = 59mm.	48
Figure 73:	Robust piercer from Barabhas , Isle of Lewis, Western Isles.	48
Figure 74:	Spurred implement from Raunds, Northamptonshire – GD = 36mm.....	49
Figure 75:	Examples of Zinken: 1-3) Classic NW European double-Zinken from Jels, southern Jutland, Denmark – GD = 57-66mm; and 4-5) slender forms recovered at Howburn, South Lanarkshire – 29mm , and Dunragit, Site 19, Dumfries & Galloway – GD = 37mm.....	49
Figure 76:	Robust Hamburgian single-bec from Howburn, South Lanarkshire – GD = 36mm, and robust Hamburgian double-bec from the same site – GD = 41mm; note the finely faceted platform remnant of the bec towards the left, defining the blank as a flake from a Levallois-like core.....	50
Figure 77:	Delicate Mesolithic becs from Llanunwas, Pembrokeshire – GD = 17-27mm.	51
Figure 78:	The bow drill has a spatially and temporally extensive distribution. It was used for a variety of purposes, from making fire to drilling holes in hard materials. This photo shows the hunter Miteq at Cape York 1909, north-western Greenland. The bow drill is a composite tool, which in this case includes a shaft with a lithic tip, a bow to make the drill shaft spin, and a stabilising piece with a depression for the shaft, which is held in the mouth.....	51
Figure 79:	Mèches de foret , as defined by Jacobi and David , from Nab Head I, Pembrokeshire – GD = 2.2-4.4mm.....	52
Figure 80:	Mèches de foret : 1) Double-pointed drill-bit from Shieldaig, Highland – GD = 16mm; and 2-6) a series of drill-bits from Nethermills Farm, Aberdeenshire – GD = 8.6-20mm. Note the scalene form furthest to the right, which has steep retouch along the entire circumference and a abraded tip.	52
Figure 81:	Backed knives: 1) A specimen of flint from Wester Clerkhill, Aberdeenshire – GD = 36mm; and 2) a specimen of carnelian from Freeland Farm, Fife – GD = 31mm.....	53
Figure 82:	Truncations: 1) A piece with an oblique truncation from Garthdee Road, Aberdeen – GD = 22mm; 2) a piece with an oblique truncation from Cutty Bridge, Pembrokeshire – GD = 23mm; and 3) a piece with an oblique truncation from Milltimber Zone 5, Aberdeenshire – GD = 31mm.....	53
Figure 83:	‘End-tools’ from Cutty Bridge, Pembrokeshire – GD = 28-33mm.	54
Figure 84:	Scale-flaked and plano-convex knives: 1-2) Scale-flaked knives from Low Caythorpe, Yorkshire – GD = 58mm; and Dunragit Site 8, Dumfries & Galloway – GD = 38mm; and 3-4) plano-convex knives from Garthdee Road, Aberdeen – GD = 34mm; and Bridlington, Yorkshire – GD = 45mm	55
Figure 85:	Laurel leaves: 1) A specimen from Hurst Fen, Suffolk – GD = 86mm; and 2) one from Stoneyhill Farm, Aberdeenshire – GD = 77mm.....	56
Figure 86:	The foliate knife from the Skilmafilly cremation cemetery in Aberdeenshire – GD = 79mm	56
Figure 87:	Comparison between the Skilmafilly knife and other foliate knives from the British Early Bronze Age.....	57
Figure 88:	Curved knives of quartz from Scord of Brouster, Shetland. The scorched surfaces of some of these pieces suggest that the blanks may have been heat-treated to allow the detachment of long and thin flakes by invasive retouch.	57
Figure 89:	Clark’s main types of discoidal knives ; the examples are all partially or completely polished.	57
Figure 90:	A selection of discoidal knives from North Dale, Callis Wold, Newark and Arbor Low, all Yorkshire – GD = 66-92mm.	58
Figure 91:	Three polished-edge knives from Charleston, Yorkshire – GD = 84mm; Linton Mires, Yorkshire – GD = 82mm; and Aldro Barrow, Yorkshire – GD = 106mm.....	58
Figure 92:	Bruised blades: 1-3) Specimens from Gatehampton Farm, Oxfordshire – GD = 150-170mm; and 4) bruised flake from Sproughton, near Ipswich, Suffolk – GD = 143mm	59
Figure 93:	Skaill knives from Skaill Bay, Mainland, Orkney	60
Figure 94:	Bifacial crescent-shaped sickle from Fimber, Yorkshire – GD = 172mm.....	60
Figure 95:	Grimes’ four main dagger types; re-drawn by the author from Grimes and Field.	61
Figure 96:	Frieman’s six dagger types; re-drawn by the author from Frieman.....	61
Figure 97:	Daggers: 1) dagger of Frieman’s Type C from Lambourn Down, Berkshire – GD = 170mm; 2) dagger of Frieman’s Type D from Burnt Fen, Norfolk – GD = 168mm; and 3) dagger of Frieman’s Type E from the Thames – GD = 176mm	62
Figure 98:	Burins: 1) Burin on a break from Howburn, S. Lanarkshire – GD = 34mm; 2) dihedral burin from Hoyle’s Mouth, Pembrokeshire – GD = 41mm; and 3) burin on a truncation from Howburn, S. Lanarkshire – GD = 38mm.....	63
Figure 99:	Selected burins from Cwm Bach I, Pembrokeshire – GD = 35-46mm	64
Figure 100:	Burin spalls: 1-2) Specimens from Kilmelfort Cave, Highland – GD = 23-27mm; and 3) overpassed burin spall from Nanna’s Cave, Caldey Island, Pembrokeshire – GD = 31mm.	64
Figure 101:	Burin on overpassed truncated ‘burin spall’ from Lunanhead, Angus – GD = 41mm : 1) Burin/burin spall; and 2) schema showing how this piece was formed.....	65
Figure 102:	Strike-a-light from the Yorkshire Wolds – GD = 77mm.	66

Figure 103:	Fire-flints: 1) Fire-flint on thermal flake; and 2) shaped fire-flint from a later Neolithic site at Townparks, Antrim town, Northern Ireland – GD = 65mm and 56mm, respectively	66
Figure 104:	The descriptive terminology of gunflints. A British blade-based gunflint is used as an example.....	66
Figure 105:	Early flake-based gunflints. Upper and lower faces of gunflints from the British ship <i>The Invincible</i> – GD = 42mm.....	66
Figures 106-107:	Blade-based gunflints: 1) British later blade-based gunflints, manufactured in Brandon, Suffolk; and 2) French later blade-based gunflints, manufactured in the Meusnes area, central France.	67
Figure 108:	Rod from the flint mines at Den of Boddam, Aberdeenshire – GD = 89mm.	68
Figure 109:	Later Neolithic polished-edge implement from East Reservoir Site 3, Yorkshire – GD = 46mm	68
Figure 110:	Two probably Mesolithic polished-edge implements from Milltimber Zone 5, Aberdeenshire – GD = 36-37mm....	69
Figure 111:	Notched pieces: 1) a piece with opposed proximal notches from Woodend Loch, North Lanarkshire – GD = 57mm; and 2-5) specimens from Cutty Bridge, Pembrokeshire – GD = 38-45mm;	69
Figure 112:	Serrated pieces: 1) Specimen from Carnoustie, Angus – GD = 44mm; and 2-3) from Flamborough, Yorkshire – GD = 50-66mm.	70
Figure 113:	Denticulated and nosed pieces: 1-6) Denticulated pieces from Llanunwas, Pembrokeshire; and 7) a nosed piece from Penpant, Pembrokeshire	70
Figure 114:	Examples of combi-tools from the Hamburgian site Howburn, South Lanarkshire – GD = 31-46mm : Two scraper/burins; one scraper/Zinken; one scraper/bec; and one scraper/polished-edge implement.....	71
Figure 115:	Transversely sharpened core axeheads: 1) Specimen from Oving near Chichester, West Sussex – GD = 168mm; 2) from Newport, Pembrokeshire – GD = 124mm; and 3) from Nab Head I, Pembrokeshire – GD = 98mm.	72
Figure 116:	Axe-sharpening flakes: 1) Specimen from Daylight Rock, Caldey Island, Pembrokeshire – GD = 36mm; and 2) from Nab Head I, Pembrokeshire – GD = 37mm.	73
Figure 117:	Flake axehead from Thetford, Norfolk – GD = 94mm.....	73
Figure 118:	Portland pick – GD = 134mm	74
Figure 119:	Seven flint/stone axehead clusters derived from k-means clustering of principal components scores for 818 specimens, plotted on the first two components. The ellipses enclose the majority of points for each cluster, and the drawings are hypothetical axeheads based on average variable scores. Types 6 and 7 tend to be edge-ground, whereas the other types are more fully ground. Re-drawn by the author from Pitts (1996). The methodology behind this figure is explained in Pitts (1996).	75
Figure 120:	Typology of Yorkshire flint axeheads.	75
Figure 121:	A selection of common types of earlier Neolithic flint axeheads: 1) Earlier Neolithic ovate axehead from Reach Fen, Cambridgeshire – GD = 148mm; 2) earlier Neolithic ovate axehead from Santon Downham, Suffolk – GD = 218mm; and 3) almost parallel-sided earlier Neolithic axehead from Forest of Bere, Hampshire – GD = 188mm. ..	76
Figure 122:	Later Neolithic 'waisted' axeheads: 1); Seamer axehead from Potter Brompton, Yorkshire – GD = 174mm; and 2) Duggleby adzehead from York – GD = 166mm.	76
Figure 123:	Outlines of a selection of less common types of Neolithic flint axeheads: 1) Axehead with straight, tapering lateral sides – GD = 190mm; 2) axehead with straight, tapering lateral sides and a rounded butt – GD = 146mm; and 3) elongated ovate axehead with edge-facets and gently ridged broad-sides – GD = 156mm	77
Figures 124-125:	Polished Crudwell-Smerrick and Single Grave Culture axeheads. The piece to the left is a Crudwell-Smerrick axehead from Hayscastle, Pembrokeshire, resembling some Scandinavian thin-butted axeheads from the Funnel Beaker Culture – GD = 230mm; the piece to the right is a Scandinavian thick-butted Single Grave Culture axehead from Yorkshire – GD = 158mm.....	77
Figure 126:	Chisels from Yorkshire – GD = c. 120mm.	78
Figure 127:	Tribrach from the Isle of Wight – GD = 158mm.	78
Figure 128:	Tools used to produce the lithic assemblages: 1) 'Classic' hammerstone of quartz from Kilmelfort Cave, Highland; 2) hammerstone/anvil of felsite from the North Roe quarry complex, Shetland; and 3) a small hammerstone/anvil of quartzite from Udal RUX6, North Uist, for finer reduction work.	79

Acknowledgements

Although the present volume was written by the author, it also includes contributions from a significant number of other people in the form of inspiration, comments and illustrations.

My interest in lithic typology began in the early 1980s, when as an unemployed librarian I went for long walks, started finding lithic artefacts, sites and assemblages, and subsequently read most of Dr Søren H. Andersen's production to identify what I had found. When I enrolled at the Prehistoric Institute, Aarhus University, Denmark, in the mid-1980s, Søren H. Andersen became my teacher in Palaeolithic/Mesolithic Studies, and I learnt much from him. In the early 1990s, I spent a number of years in Norway where I honed my typological skills on the 700,000-piece lithic assemblage from the Farsund Project, SW Norway, as well as numerous other assemblages. I would like to thank Dr Perry Rolfsen, Oldsaksamlingen, Oslo, for inviting me to do this work and supporting me along the way. After having arrived in Scotland in 1998, I obviously read what was available on Scottish and British lithics, and had many highly inspiring and educational discussions with the late Alan Saville, Principal Curator at National Museums Scotland. Alan is sorely missed.

During the writing of this book, Dr Andrew David, formerly of English Heritage, kindly commented on several drafts of the manuscript, and he also permitted me to use many of his excellent line drawings of lithic artefacts. It would not have been possible to produce this volume without his input. At the end of the process, Professor Karen Hardy, Universitat Autònoma de Barcelona, reviewed the final draft of the manuscript. I am grateful to them both. Thanks are owed to Beverley Ballin Smith for copy-editing the volume.

Drawings and photographs have been borrowed from my own publications, but also from the works of colleagues, and I am grateful to all archaeological institutions and units, authors and excavators, as well as artists and photographers who permitted me to use their illustrations. Permission was obtained from the following institutions: National Museums Scotland, Edinburgh; Amgueddfa Cymru/National Museum Wales, Cardiff; Tenby Museum, Tenby, Wales; and The Danish National Museum, Copenhagen. Permission was also granted from the following archaeological units: Argyll Archaeology, Argyll; Cameron Archaeology, Aberdeen; CFA Archaeology, Edinburgh; GUARD Archaeology Ltd., Glasgow; Headland Archaeology Ltd., Edinburgh; and Murray Archaeological Services Ltd., Aberdeenshire. The following authors, excavators and curators also gave me permission to use their material: Principal Curator Martin Appelt; Professor Nick Barton; Dr Barry Bishop; Dr Ann Clarke; Dr Andrew David; Dr Jørgen Holm; Dr T.G. Manby; Dr Michael Reynier; Dr Derek Roe; Principal Curator Alan Saville/Annette Carruthers; Principal Curator Peter Vang Petersen; Professor Pierre Vermeersch; Dr Katherine Walker; and Ms Caroline Wickham-Jones. Comments, advice and other forms of assistance were offered by: Dr Berit Eriksen; Dr Catherine Frieman; Dr Frances Healy; Dr Elizabeth Healey; Professor Marcel Otte; Dr Lou Schmitt; Principal Curator Alison Sheridan; Principal Curator Elizabeth Walker; and Dr Mara Weber.

The volume's illustrations are by the following artists and photographers (P): Beverley Ballin Smith (P); Jordan Barbour; Nick Barton (P); Alan Braby; M.H.R. Cook; Andrew David; Leeanne Demay (P); Jan Dunbar; Jørgen Holm; Sandra Kelly; Jim Leary (P); Hazel Martingell; T.G. Manby; Woody Musgrove (P); Gunther Noens; Marion O'Neil; Annette Olsson, Michael Reynier; Allan Saville; Joyce Smith (P); Alexandra Speir; Thomas Thomsen (P); J. Swain; Jeff Wallis; and Leeanne Whitelaw.

Every effort has been made to obtain permission to reproduce illustrations; if any have been reproduced inadvertently without permission, I hope that my apologies will be accepted.

Although support and advice has been received along the way, I take full responsibility for any surviving errors.

Preface

Only a small number of guidebooks on British lithic typology have ever been produced, the most important of these being Evans' *Ancient Stone Tools of Great Britain* (first edition 1872; second edition 1897) and – more than a century later – Butler's *Prehistoric Flintwork* (2005). In addition, volumes on lithic typology and technology have been published outside Britain, but in English, such as Inizan *et al.*'s *Technology of Knapped Stone* (1992; first English edition 1974). The latter is a highly useful typological manual to all lithics specialists and enthusiasts throughout the world. Recently, an attempt was made to produce a thesaurus or encyclopaedia of British lithics – including typological, technological and other aspects of the field – but this impressive project was sadly never completed (Healey 2005).

These different volumes were structured in a number of different ways. Some were organised by type (e.g., Evans 1897), others by period (e.g., Butler 2005), whereas some were organised alphabetically (e.g., Inizan *et al.* 1992 and Healey 2005). The structure of the present book corresponds mostly to that of Evans ('... *reducing the whole series into some sort of classification...*'; Evans 1897: 1), and it is sorted by type. However, where Evans' types were sorted according to the author's subjective idea of which types were the most important, spectacular or interesting, the present volume is organised on the basis of a form of hierarchical classification system, where the main classes (debitage, cores, preparation flakes and tools), are subdivided into main types (e.g., arrowheads, scrapers, piercers, etc.) and then sub-types (e.g., end-scrapers, side-scrapers, hollow scrapers, etc.) (Figure 1).

The intended audience of this volume is expected to include students, museum staff, non-specialist colleagues, local groups and lay enthusiasts. Although I hope readers will find the book useful, it is important to emphasise that my intention was not for it to *replace* the works listed above, but to *complement* them. Although the above volumes all deal with typological matters, their slightly different *foci* and structures mean that different people may find different works more or less useful in different contexts. Evans (1897), Inizan *et al.* (1992) and Butler (2005) will continue to be valuable reference works.

This typological guidebook represents approximately five years of work, from the first notes in 2015, through the ScARF workshop in early 2017 and the BAJR lithics guide later in 2017, to the final push during the 2020 Covid-19 lockdown, resulting in the publication of the present book. It should be borne in mind, though, that typological work never reaches an end. Over the years,debitage, core and tool types have been re-interpreted: some 'chisels' became 'bipolar cores', and new types were discovered, such as the Middle and Late Neolithic 'Levallois-like cores'. In a decade or two we are likely to be in a different place from the present, with yet other lithic types having been either reinterpreted or discovered. It may then be necessary to replace or complement *this* typological guidebook.

Until then – I hope you will find the book useful.

Classification and characterisation of lithic artefacts

The background to and aims of the present volume

As a lithics specialist, the author is frequently asked to organise lithics workshops, the main purpose of which is to teach anybody with an interest in prehistoric lithic artefacts the basic elements of this specialist field. Some of these workshops were aimed at staff and volunteers at local museums, whereas others were aimed at university-based colleagues, colleagues in archaeological units, enthusiasts taking part in adult and continuing education (DACE), or local volunteer groups.

In March 2017, the Scottish Archaeological Research Framework (ScARF) organised a lithics workshop in Edinburgh. The author was one of several speakers, and he gave a 'hands-on' presentation of the main types of lithic debitage, cores and tools that people interested in early prehistoric archaeology may encounter. Following this event, British Archaeological Jobs and Resources (BAJR) contacted the author, and it was agreed to transform the author's ScARF presentation into a BAJR guide for British lithics (Ballin 2017c). The latter guide should be perceived as a brief introduction to lithics showing the reader 'how to squeeze blood from stones' – that is, how to interpret the past through the lithic evidence.

However, although the BAJR guide might give the reader some ballast in terms of dealing with lithics, the guide's section on terminology and typology is basic, and some colleagues and enthusiasts may feel a need for more detail to allow them to process lithic artefacts collected or excavated in the field, or in old, unprocessed museum collections. To present a lithic assemblage in an unequivocal manner, and to allow it to be compared to other collections, the descriptive terminology and typology must be clear and it must be possible to distinguish clearly between formally related types. Simply put: What defines Object X as belonging to a particular class or type of artefact, and not another?

The purpose of this typological guide is therefore – in contrast to the more general BAJR guide – to present all the prehistoric lithic objects (including all artefact classes, types and sub-types) one might encounter in Britain, and to discuss their definitions: for example, what defines Object X as a tool and not a piece of debitage or a core; what defines a microlith as a microlith and not a knife or a piercer; and what defines a specific implement as a scalene triangle and not an isosceles one? To allow the individual categories of lithic objects to be classified and characterised in detail, it was necessary to first define a number of descriptive

terms, which forms the first part of this guide. The main part of the book is the lithic classification section, which offers basic definitions of the individual formal debitage, core and tool types. The intended audience of the volume is students, museum staff, non-specialist colleagues, local groups and lay enthusiasts.

Other lithic typologies have been published in the past, but with a different focus or structure, such as Butler (2005), which offered a period-by-period account describing the various types and sub-types as they developed through time. It is important to emphasise that the present volume does not replace those works; rather it should be seen as a supplement which focuses first and foremost on the definition of formal types by their differing shapes, sizes, retouch, etc. Some older typologies like Evans' (first edition 1872; second edition 1897) ground-breaking *Ancient Stone Implements of Great Britain* are also still useful.

It is necessary to emphasise that it will never be possible to produce a *definitive* typology on lithic artefacts from any country or region as typological work is an ongoing process. As we find new assemblages and individual lithic artefacts or develop new approaches to characterising and interpreting lithics, new meaningful (for example diagnostic) types or sub-types will be defined (e.g., the 'micro *petit tranchets*', see below) or old types will be reinterpreted (some 'chisels' are now defined as bipolar cores).

It is also important to underline what this volume is not and what it does not include. A previous attempt to put together a British lithics Glossary or Thesaurus (Healey 2005) was unfortunately never completed. This project was a collaborative effort which, although led by Elizabeth Healey, University of Manchester, involved distinguished lithics specialists such as the late Alan Saville, Caroline Wickham-Jones, Stephen Aldhouse-Green, Frances Healy and many more. In the draft introduction the aims of this glossary were defined as:

- Summarising the main aims of concern in contemporary lithics studies
- Highlighting current analytical practices
- Compiling a comprehensive and fully illustrated glossary of technological and typological terms as used in the UK.

It is this author's view that the project may simply have been too far-reaching as it attempted, in the most impressive way, to cover too much with the involvement of too many people – we have to realise that no two lithics specialists agree on all points.

The present volume is just a classification system, supported by an introductory section on basic descriptive terms necessary to define the various lithic types. It does not cover:

- Lithic raw materials.
- Reduction techniques. Only a basic introduction is given to allow the classification of cores as platform cores, Levallois-like cores and bipolar cores, etc.
- Analytical approaches like use-wear analysis, intra-site distribution analysis, experimental flint-knapping, technological attribute analysis (usually associated with blade production), ethno-archaeological comparison, etc. These approaches are all well-covered elsewhere in the archaeological literature.
- Northern Irish material is not generally included, as during prehistory this part of Britain tended to follow different typological and technological traditions. As for Ireland more widely, there are clear differences with mainland Britain (Bann flakes and butt-trimmed flakes, for example [Woodman *et al.* 2006: 118], and some arrowhead types [ibid. 127-155]). Hollow scrapers are included in this volume as the occasional imported piece may be found in south-west Scotland.
- And it was decided to cover only the period from the Late Upper Palaeolithic (LUP) to the Early Iron Age, as Lower and Middle Palaeolithic industries are covered extensively elsewhere in the archaeological literature (e.g., Roe 1981; Pettitt & White 2012).

Chronology

The basic chronological framework applied in this volume corresponds to that defined in Ballin (2017c: 6), and it is presented in Table 1. This chronological schema was developed for use in Scotland, but the author believes that it is also valid (with slight adjustments) in the rest of Britain.

The evidence suggests that the British LUP period is aligned with contemporary industries on the north-west European mainland identified as the Hamburgian/Creswellian,¹ *Federmesser-gruppen*, and Ahrensburgian techno-complexes, as Britain would have been in touch directly or indirectly with these groups across the then dry Doggerland and the English Channel area (Ballin 2016c; Ballin & Bjerck 2016; Brooks *et al.* 2011; Sturt *et al.* 2013).

¹ The Hamburgian and Creswellian industries have been suggested to represent local variations of the Late Magdalenian complex; e.g., Pettitt & White (2012: 435).

For approximately half a century, the British Mesolithic has been subdivided into an early and a late part, defined *inter alia* by the dominance of either broad or narrow blades/microliths. It is recommended that the terms ‘broad blade’ and ‘narrow blade’ should not be used as period-defining terms, as blades in various parts of the country differ in terms of width.

Instead, use of the terms ‘Early Mesolithic’ and ‘Late Mesolithic’ is preferred as these emphasise microlith *form* as well as *size*. Although idiosyncratic microlith forms occur at all times through the Mesolithic (cf. Butler 2005), the British Early Mesolithic period is associated mainly with obliquely blunted points and isosceles triangles (and in England a number of other types, such as Horsham points and Honey Hill microliths), and the Late Mesolithic period mainly with scalene triangles, crescents and edge-blunted pieces. As a rule of thumb, the transition between the two Mesolithic periods could be defined as the time when isosceles triangles were replaced, probably gradually over a few hundred years, by scalene triangles. The transition between the British Early and Late Mesolithic periods is defined as in Saville (2008), and supported by Conneller *et al.* (2016: Figure 8), with the appearance of the first scalene triangles dated to around 8400 cal BC and 8300 cal BC.

A number of Early Mesolithic industries known from England – such as the Deepcar, Horsham and Honey Hill industries (Reynier 2005) – have not yet been identified north of Lincolnshire (Butler 2005; Waddington *et al.* 2017). Within Britain, the Scottish Early Mesolithic material appears to be related to the English Star Carr group (Clark 1954; Conneller *et al.* 2018), but overall it seems to follow closely developments in north-west Europe (southern Scandinavia and northern Germany), until maybe a millennium into the Late Mesolithic period, when the Doggerland land-bridge connecting Britain and the European continent finally disappeared (Ballin 2016c; Ballin & Ellis 2019).

It has been suggested to define assemblages with basally modified microliths (i.e., Horsham and Honey Hill points) as Middle Mesolithic, as radiocarbon-dated assemblages with such microliths straddle what is presently known as the Early/Late Mesolithic transition from 8690–8335 cal BC to 6960–6460 cal BC at 68% probability (Conneller *et al.* 2016: Figure 8). However, it should be borne in mind that some of the radiocarbon-dated sites on which this suggestion is based may be mixed, such as Ashfordby in Leicestershire, which includes broad as well as narrow microliths, as well as a relatively large number of large and small scalene triangles (Cooper & Jarvis 2017).

The British Neolithic and Bronze Age phases are defined on the basis of not only lithic material but also pottery styles, supplemented by metalwork.

Table 1. Basic chronological schema for Britain's early prehistory (cal BC). The dates for Scotland are mainly based on dates from the various Scottish research framework (ScARF) panel reports (Saville & Wickham-Jones 2012; Brophy & Sheridan 2012; Downes 2012; information relating to the LUP Sonia Grimm pers. comm.). The post Mesolithic dates for England are based on Historic England's period list (<http://www.heritage-standards.org.uk/chronology>), and the LUP dates for England are based on Pettitt (2008, Table 2.1) and calibrated by the author using the calibration software OxCal 4.3 (Bronk Ramsey 2019).

Main periods	Sub-periods	Scotland	England
Bronze Age	Late Bronze Age	1,150-800	1,200-700
	Middle Bronze Age	1,550-1,150	1,600-1,200
	Early Bronze Age	2,200-1,550	2,600-1,600
	Neo/BA transition (Chalcolithic)	2,450-2,200	
Neolithic	Late Neolithic	3,000-2,500	2,900-2,200
	Middle Neolithic	3,500-3,000	3,300-2,900
	Early Neolithic	4,000-3,500	4,000-3,300
Mesolithic	Late Mesolithic	8,400-4,000	8,300-4,000
	Early Mesolithic	9,800-8,400	10,000-8,300
Late Upper Palaeolithic (LUP)	Ahrensburgian	10,800-9,800	11,000-9,500
	Federmesser-gruppen	12,000-10,800	11,900-11,000
	Hamburgian/Creswellian	12,700-12,000	13,000-11,900

Artefact classification

It is the author's view that the classification and definition of lithic types, like the classification of all other forms of material culture, is best carried out within a hierarchical system, a classification 'tree'. In this respect, the author has clearly been guided by his background as a librarian and his experience with Dewey's Decimal Classification System (Dewey 1876, with later updated versions). This system is based on objective content ('type'), and its hierarchical structure allows new discoveries to be slotted in at appropriate places.

The Dewey-style hierarchical classification system is based on formal similarities and differences and it is essentially interpretation-free. Some might comment that the names of the various types may be based on interpretation, but although the term 'end-scraper' implies that these pieces were used for scraping, general consensus today is that this is a formal and not functional term, and that although these pieces may mostly have been used for scraping, end-scrapers are first and foremost defined as elongated pieces with a mostly convex retouch at one end.

As shown in Figure 1, the author suggests a basic subdivision of lithic objects into the classes: *debitage*, *preparation flakes*, *cores* and *tools*. Some might suggest the addition of a fifth basic category, *by-products*, which would include pieces like tranchet flakes (axe-sharpening flakes), microburins and burin spalls, that is, waste products from the manufacture of axeheads, microliths and burins. This would make technical sense, but the author finds it more helpful in a lithics guide to deal with these artefacts in connection with their

complementary pieces: tranchet flakes with axeheads; microburins with microliths; and burin spalls with burins.

The author defines *debitage* as a category embracing all objects removed from cores in connection with the reduction of the latter (in accordance with Inizan *et al.* 1992: 84). Some colleagues define *debitage* as synonymous with *waste*, but it is the author's view that this definition is unworkable as it is based on an interpretation. When is a flake or a blade a waste product, a tool blank or an informal tool? The definition of *all* flakes or blades as either waste, blanks or informal tools would require use-wear analysis to be carried out, which is not always possible, whereas the definition of *debitage* as all pieces produced in connection with the reduction of a core is interpretation-free. When modified, a piece of *debitage* then becomes a formal tool. In some cases, analysts may find it relevant to add a category of 'utilised pieces' to their general artefact lists (i.e., pieces with macroscopic use-wear; see below) to embrace pieces of *debitage* which have *clearly* (i.e., without carrying out microscopic analysis) been used.

Selection of illustrations

Aesthetically speaking, it would have been preferable for the volume's accompanying illustrations to be all in the same format/style and created by one artist. Good examples of this approach are Vang Petersen's (1993) book *Flint fra Danmarks Oldtid* (Flints from Danish Prehistory) where all artefacts were drawn by the gifted Lykke Johansen, and John Evans' (1897) classic *Ancient Stone Implements of Great Britain*, where all artefacts were illustrated by John Swain in the form of beautiful engravings.

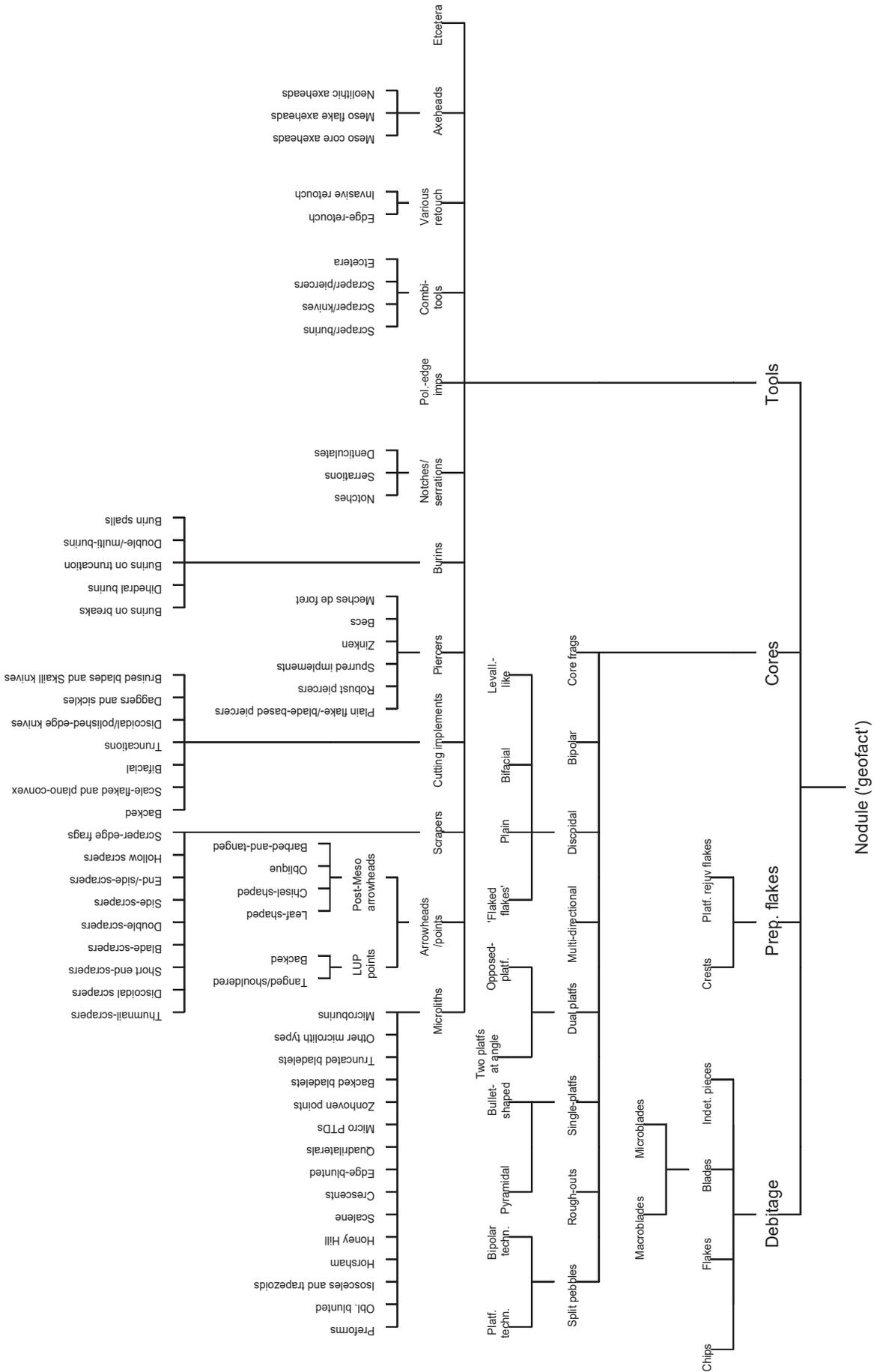


Figure 1: Hierarchical classification system (classification 'tree') covering British lithic types; it is possible to continuously and indefinitely subdivide the tree. The purpose of this figure is to illustrate the key principle behind hierarchical classification, and it does not include all types mentioned in the typological section

However, this was not possible for several reasons. Firstly, it would have been exceptionally expensive to employ an artist to carry out this work, and without funding this was not feasible. Secondly, it has taken several years to produce the guide, and it has been the author's fear that being too ambitious in terms of its topical focus (see above), the involvement of other specialists, or the production/selection of illustrations might sink the project. He therefore chose to illustrate the volume by borrowing existing illustrations, as he did when he produced his monograph *Klassifikationssystem for Stenartefakter* (Classification of Lithic and Stone Artefacts), which discussed the lithic artefact types encountered in southern Norway (Ballin 1996). A large number of the illustrations are therefore from the author's own publications or borrowed from archaeological units and colleagues he has worked with in the past. Excellent illustrations of some complex and rare types (e.g., tribrachs) were borrowed from Evans (1897), and John Swain's engravings are precise and aesthetically pleasing.² A small number of pieces were redrawn by Leeanne Whitelaw.

Due to the way illustrations were selected, it has not always been possible to include a scale in the figures. In these cases, the captions include information as to the greatest dimension (GD) of the artefacts. Also, different artists have followed different standards in terms of indicating the presence/absence of a bulb of percussion on blanks and tools. The following three systems were used by the artists responsible for this volume's artefact drawings (present/absent): ●/○; +/○; and +/● (see Martingell & Saville 1988: 22). It should also be noted that although the standard today is to illustrate flake and blade tools with their proximal end down and microliths with their tip (usually the proximal end) up, some older drawings follow other principles, and some microliths have been drawn with their proximal end down (see for example, the microliths from Jura (Figures 48 and 54).

² According to international copyright legislation, it is permissible to use illustrations from volumes 75 years after the author's death.