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FICHE 3: CONTENTS

(see 1 : D1 for detailed list)

Pins

616** Compact bone, trimmed all over, waisted tip, polished all over. L 83mm. WB.C8/24, Cell 8, Floor I. Period B2.

617** Compact bone, trimmed and ground, flat head, circular polished point. L 84mm. WB.CI3/I, Cell I3, Floor I. Period B2.

618* Compact bone, trimmed and ground, oval polished point, broken, head missing. L 35mm. WB.I3.23/3, central area, floor. Period B2.

Needles

612** Sheep os malleolare shaft trimmed and ground, polished or worn. Flat head with irregular perforation cut from both sides. L 87mm. WA/48. Period A u.s.

613* Compact bone, trimmed and ground, shaft widens around perforation D 3mm, drilled, broken at both ends. L 27mm. WA/5I. Period A u.s.

614* Rib, split, trimmed and ground, flat in section and curved. Perforation cut from both sides, D c 5mm, I5mm from head, polished all over. L 87mm. WA/I7. Period A u.s.

615** *Compact bone, split and trimmed, polished all over from use.* Expanded angular shoulders, irregular cut perforation, D 3mm. L 74mm. WB.SE/1. Period B2.

Spatulae

626** Compact bone, trimmed, miniature spatula with narrow worn blade, shaft rectangular, broken. L 40mm. WB.C6/22. Cell 6, Floor 4. Period B2.

663* Rib, split and roughly trimmed at one end into a blunt point, worn at point and whole of distal end. Notch at proximal end may not be functional. L I38mm. WB.NE/2, floor. Period B2.

Spatulae/points - ?potting tools

627* Compact bone, curved, trimmed and smoothed. One end flat and spatulate, the other a long acute point. Worn all over particularly on the convex side. L 108mm. WB.NE/33, Pit 5. Period B1.

628** Antler tine, curved, chopped at proximal end, shaft slightly trimmed and worn through handling. Spatulate point trimmed by two flat facets to a chisel end, very worn. L 148mm. WA/62. Pit 3 below early floor. Period A1.

629** Compact bone, trimmed, ground and polished all over. One end spatulate, blunt, the other end curved to a rounded blunt point. Both ends show considerable wear. A very well finished object. L 165mm. WB.C10/10, Cell 10, Pit 1. Period B1.

Pegged plates

630** Compact bone, trimmed all over and partly smoothed. Plano-convex in section with slight bevel at short ends. Sub-rectangular plate with four perforations, one at each corner. The holes are cut, not drilled, from the convex side and 3-4mm across. One hole retains a broken bone peg L 7mm, D 3mm. Size 64 x 21mm. WA/33. Period A2.

631** Antler, one long edge sawn, trimmed all over. Sub-rectangular plate with three perforations along the centre line. Plano-convex in section. All three holes contain broken bone pegs D *c.*3mm. Two pegs project slightly above the outer surface and one is worn smooth. Size 70 x 19mm. WA/82. Period A2.

632* Antler, untrimmed outer surface, other faces trimmed. Sub-rectangular plate with four perforations along central line. Section plano-convex, short ends bevelled. Perforations drilled, D 3mm, no pegs survive. Size 70 x 26mm. WA/93. Period A2.

633* Antler, edges and lower surface trimmed. Irregular shape, broken at one end. Two lage perforations at one end, one cut 6 x 7mm, the other drilled D 5mm. Sub-rectangular in section, ?unfinished. Size 70 x 16mm. WB.CI3/5, Cell 13, Floor 2. Period B2.

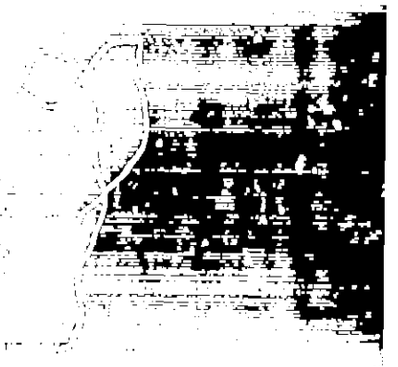
634* Antler, trimmed all over and smoothed. Sub-rectangular plate with four perforations along central line, two at each end. Holes D 3-4mm, drilled. Sub-rectangular in section. Size 73 x 20mm. WB.CI3/6, Cell I3, below Floor 2. Period B1.

Handles

635* Antler beam, one end chopped, trimmed all over, smoothed by handling. One end has rectangular socket 12 x 4mm extending 22mm into cancellous tissue. The other e[illegible] has a circular socket 7 x 8mm, 16mm deep. A fragment is broken off one end. Iron staining in rectangular socket. L 82mm, section 20 x 17mm. WA/50. Period A2.

636* Antler tine, sawn end, untrimmed. Circular socket D 7mm, 25mm deep. Other end broken. L 38mm. WB.EN/2. Period B midden.

637* Antler tine, proximal end trimmed to blunt point with groove cut round 20mm from tip to give phallic shape. Distal end with conical socket D 10mm, 21mm deep. L 82mm. WB.EE/5, crevice in south entrance wall. Period B?1.



Socketed objects

638** Antler beam-tine junction, sawn at both ends and tine sawn off. Proximal end smoothed and all exterior surfaces showing handling wear. Distal end has wide circular, cylindrical socket (much wider than cancellous tissue) D *c.*23mm. The base of this socket has a groove and a hemispherical bottom, as if worn in use. A large perforation *c.*13 x 10mm is cut (not drilled) transversely through the beam. Both ends of this hole are set in rectangular recesses 10 and 7mm deep, one is 20mm wide, the other broken. The transverse and end perforations may not be contemporary. A large piece has broken off between the two perforations. L 121mm. WA/81. Period A1.

689* Antler, tines sawn off, broken at one end where a large hole has been cut, D *c.*16mm. This hole sits in two transverse cuts (cf 638) which penetrate almost to the cancelous tissue. The surface has patches of red pigment (hematite). L 103mm. WB.SC/3. Period B midden.

671 Antler beam, broken fragment,end sawn, surface trimmed and heavily worn through handling. Traces of a transverse socket near one end. L 35mm. WA/1,4,5. Period A u.s.

Bobbins or Toggles

639** Sheep metacarpal, one end gnawed, transverse hole cut through centre of shaft, perforation hour-glass shaped, D 4mm. Shaft polished by usage. L 94mm. WB.C8/12, Cell 8, Pit 4. Period B1.

668 Sheep tibia, roughly knife trimmed all over. L 77mm. WB.C12/4, Cell 12, floor. Period B2.

Pivots

640** Antler tine, tip chopped and broken off, other end slightly trimmed and then worn with turning marks to projecting peg. This wear has broken through to the cancellous tissue. L of peg 18mm. Total L 88mm. WA/39. Period A u.s.

641* Antler beam, end chopped and broken off, surface of shaft worn and cut. Other end worn by turning marks to an asymmetrical peg, L 21mm, breaking through to cancellous tissue. L 81mm. WA/50, south guard-cell of late entrance. Period A2.

642** Antler tine, unmodified. One end has cylindrical peg formed by turning marks, L 11mm. Total L 66mm. WA/50. Period A2.

643* Antler tine, tip chopped and broken off. Other end with conical peg formed by turning marks, L 12mm, with a subsidiary area of wear below this. Total L 76mm. WA/74. Period A2.

644* Antler, longitudinal fragment,one end chopped, other with traces of turning marks. L 77mm. WA/90. Period A2.

645* Antler, chopped off at burr, one end with faint turning marks. Broken lengthways. L 31mm. WB.EN/7. Period B midden.

646* Antler, chopped at one end, other with series of turning grooves of decreasing diameter. Broken at this end. L 33mm. WB.SC/3. Period B midden.

647* Antler, chopped and trimmed at one end, other end with traces of turning, both ends broken and longitudinal segment missing. L 46mm. WB.SC/3. Period B midden.

648* Antler beam, fragmentary and decayed with turning marks at both ends (not deeply worn). L 100mm. WB.C5/3, Cell 5, Floor I. Period B2.

649* Cetacean bone, crudely trimmed to a broken blunt point at one end, other end worn with turning grooves. Object has been re-used as a pounder, leading to the spalling of the turned end. L 143mm. WB.I3/3, backfill. Period B u.s.

651 Cetacean bone, small fragment with turning marks, possibly part of 649. L 40mm. WB.NW/12, floor. Period B2.

652* Antler beam, broken, signs of turning wear running diagonally across length, no groove marks. L 97mm. WB.NW/20, SE/6, NE/28. Period B1 or B2.

710* Antler tine, tip chopped off, slightly trimmed, with turning groove worn at one end, exposing cancellous tissue. L 65mm. WA/84, south guard cell. Period A2.

Gaming Pieces

653* Antler, two part peg with a hemispherical roughly trimmed head, [illegible] with a conical peg inserted on the lower surface, L 25mm. The [illegible] handling wear. WB.NW/22, Pit 20. Period B1.

664* Compact bone, sub-rectangular tablet, trimmed and smoothed all over and polished with wear. L 31mm. WB.SE/3, upper floor. Period B2.

Whalebone vessels

654* Cetacean vertebra, processes chopped off, hollowed to form sub-rectangular vessel, broken, only one wall remains. Maximum height of vessel 161mm, base thin 2-10mm. WB.SW/8, floor. Period B2.

655** Cetacean vertebra, processes chopped off, central area of one surface roughly chopped out in hollow for ?unfinished vessel. The opposite surface has a series of chop and cut marks as if used as a chopping block. Decaying in places with a few fragments missing. Height 115mm. WB.SW/28, Pit 15. Period B1.

Polishers

660* Antler tine, tip worn, other end chopped and showing signs of polish through wear. One edge in particular has the glossy smoothing of prolonged use. L 175mm. WB.13.23/2, backfill. Period B [illegible].

723 Antler beam, fragment showing polishing on one edge. L 65mm. WB.I3.23/2, backfill. Period B u.s.

Notched objects

657* Cetacean bone, chopped and trimmed, broken at both ends. Sub-rectangular peg with two deep V-shaped notches on one side. L 80mm. WB.EE/I. Period B midden.

659** Cetacean bone, split and trimmed, sub-rectangular, both ends roughly chopped to blunt points. One face smooth and polished the other rough with shallow broad notch chopped transversely. L 105mm. WB.SC/2. Period B midden.

662** Compact bone, thin fragment with one edge cut in a series of small notches. Surfaces show signs of polish through wear. L 73mm. WB.I3/9, Cell 5, crevice in wall. Period B ?u.s.

Whalebone Wedges

661** Cetacean bone, very dense, split and trimmed. Rectangular with one chisel end of rounded profile. This end is worn glossy smooth and grooved through use, polish extends all over one surface. This surface has three transverse saw grooves dividing the object into four blocks 55-60mm long. Two of these grooves are paralleled on the other face. The two nearest the chisel end are very faint having been worn away after being cut. L 235mm. WB.EN/6. Period B midden.

737* Cetacean bone, fragment of a chisel end of similar profile to 661, showing polish on one face. L 98mm. WB.EE/I. Period B midden.

747* Cetacean bone, split and trimmed. Sub-rectangular with both ends broken off. One face has wear-polish patch, the other shows signs of beginning of chisel end. L 127mm. WB.EN/5. Period B midden.

751* Cetacean bone, fragment of edge showing chisel profile and wear-polish at one end. L 111mm WB.EE/8. Period B midden.

?Stake

665** Cetacean bone, one end chopped, other broken. Shaft trimmed on one side. Usage wear around the haft, as if held. L 268mm. WB.C10/2, Cell 10, floor. Period B2.

Scapula ?shovels

758 Cattle scapula, broken, wear on broken end. L 210mm. WA/75. Period A u.s.

762 Scapula, broken, polish all over. L 140mm. WA/90. Period A2.

763 Cattle scapula, fragmentary, polish wear over narrow end including broken edges. L 217mm. WA/98. Period A2.

Cetacean bone-working debris

From Period B midden

656* Rectangular block, sides split, one end trimmed roughly round, other sawn. Shallow saw cut groove across one face. 61x28x27mm. WB.EE/1.

725 Irregular fragment, split and broken. 42 x 15 x 8mm. WB.EE/2.

726 Rectangular plate, sides split and trimmed, both ends broken. 115 x 25 x 15mm. WB.EE/1.

727 Rectangular segment, ends sawn, sides split, untrimmed. 50 x 25 x 16mm. WB.EE/1.

728 Rectangular segment, plano-convex, ends sawn, sides split 55 x 34 x 14mm. WB.EE/1.

729* Rectangular block, ends sawn, sides split and trimmed to regular shape. 65 x 18 x 11mm. WB.EE/1.

730 Sub-rectangular segment, ends sawn, one edge split, others trimmed, perhaps part of an object cut up for reuse. 74 x 23 x 19mm. WB.EE/1.

731 Rectangular segment, plano-convex, ends sawn, sides split, untrimmed 60 x 35 x 17mm. WB.EE/1.

732 as 731. 52 x 37 x 20mm. WB.EE/1.

733 as 731. 67 x 35 x 18mm, joins 732. WB.EE/1.

734 as 731. 73 x 40 x 20mm. WB.EE/1.

735 as 731. 66 x 35 x 16mm. WB.EE/1.

736** Thin rectangular plate, ends sawn, sides split and trimmed, one face sawn. 61 x 20 x 9mm. WB.EE/1.

738 Rectangular segment, ends sawn, sides split, 77 x 35 x 17mm. WB.EE/1.

739 Small fragment, split, L 23mm. WB.EE/2.

740 Small fragment, split, L 31mm. WB.EE/2.

741 Fragment, end sawn, split. L 31mm. WB.EE/2.

742 Fragment, end sawn, sides split. 23 x 27mm. WB.EE/2.

743 Fragment, split, L 29mm. WB.EE/2.

744 Fragment, split, L 60mm. WB.EE/2.

745 Fragment, end sawn, split. L 35mm. WB.EE/2.

746 Fragment, end sawn, split. L 35mm. WB.EE/2.

748* Rectangular bar, ends sawn, sides split and trimmed . 200 x 37 x 20mm. WB.EN/6.

749* Rectangular plate, ends sawn, sides split and trimmed, two transverse saw-grooves in middle. 70 x 25 x 15mm. WB. ES/3.

750 Fragment, end sawn, split. L 70mm. WB.ES/3.

752 Fragment, ends sawn, split and trimmed. L 77mm. WB.SC/2.

755 Segment of ? paddle bone, ends chopped, untrimmed. L 100mm. WB.13/7. Period B midden.

From Period B1, B2 and B u.s.

700 Fragment, trimmed and broken. L 45mm. WB.SE/4, floor. Period B2.

753* Rectangular block, ends sawn, sides split. 26 x 27 x 21mm. WB.C2/6, Cell 2, Pit 1. Period B1.

754* Rectangular segment, ends sawn, plano-convex, sides split. 12 x 38 x 13mm. WB.C9/35, Cell 9, Pit 21. Period B1.

756 Rectangular segment, ends sawn, sides split. 48 x 20 x 17mm. WB.CC/2, Cell C. Period B u.s.

Antler-working debris

650 Tine, chopped, tip broken. L 76mm. WB. 'Cells'. Period B u.s.

672 Burr and brow tine, shed, chopped off. L 128mm. WA/39. Period A u.s.

673 Beam, chopped and partly trimmed. L 67mm. WA/58. Period A2.

674-7 Beam, fragments, split. L 81, 49, 40, 25mm. WA/71. Period A2.

678 Beam, one end chopped, split lengthways, fragmentary. L 156mm. WA/71. Period A2.

679 Beam/tine junction, ends chopped. L 115mm. WA/78. Period A2.

681 Beam, split lengthways, broken. L 75mm. WA/80. Period A u.s.

682 Beam, tine chopped off, split fragment. L 110mm. WA/80. Period A u.s..

683 Beam, chopped and split fragment. L 69mm. WA/92. Period A u.s.

684 Beam, end ?sawn, split fragment. L 83mm. WA/98. Period A2.

685 Beam, split fragment. L 84mm. WB.EE/2. Period B midden.

686 Beam, end ?sawn, trimmed. L 60mm. WB.EN/5. Period B midden.

687** Beam section, ring-shaped, both sides sawn. W 8mm, section 28 x 19mm. WB.EN/5. Period B midden.

688 Beam, fragment, split, trimmed. L 53mm. WB.ES/3. Period B midden.

693 Beam,fragment, chopped both ends, split. L 54mm. WB.SC/3. Period B midden.

694 Beam base, chopped and trimmed, broken. L 56mm. WB.C5/26. Cell 5, Floor 3. Period B2.

695 Beam, tine chopped off, ends chopped and trimmed. L 183mm. WB.13/1, backfill. Period B u.s.

696 Beam, ends sawn, tine chopped off. L 121mm. WB.C14/5, Cell 14, floor. Period B2.

697 Base, burr and beam, shed, end chopped. L 75mm. WB.'Cells'. Period B u.s.

698 Beam, end chopped, split fragment. L 68mm. WB.'Cells'. Period B u.s.

699 Beam base, end chopped, trimmed, burnt and broken. L 53mm. WB.NE/24. Period B u.s.

701 Beam, split fragment, trimmed. L 78mm. WB.SW/7. Period B2.

702 Beam, split fragment. L 62mm. WB.SW/7. Period B2.

703 Beam, split fragment. L 60mm. WB.CA/3, Cell A, midden below floor. Period B midden.

704 Beam, split fragment, trimmed. L 79mm. WB.CC/1, Cell C. Period B u.s.

705 Beam, end chopped, split fragment. L 48mm. WB.CC/3, south of Cell C. Period B u.s.

706 Tine, both ends broken. L 69mm. WA/2. Period A u.s.

707 Tine, end chopped. L 88mm. WA/6. Period A u.s.

708 Tine, end chopped, tip missing. L 113mm. WA/15. Period A2.

709 Tine, end chopped. L 80mm. WA/26. Period A2.

711 Tine, end ?sawn, split. L 60mm. WA/56. Period A1.

712 Tine tip, end sawn. L 50mm. WB.EE/1. Period B midden.

713 Tine tip, point sawn off, other end broken, traces of red pigment. L 39mm. WB.EN/1. Period B midden.

714 Tine tip, end chopped. L 68mm. WB.EN/4. Period B midden.

715 Beam, end sawn, split fragment. L 75mm. WB.EN/7.Period B midden.

716 Tine, split and trimmed. L 84mm. WB.C5/26, Cell 5, floor 3. Period B2.

717 Tine, sawn off, tip broken off. L 168mm. WB.13/4. Period B midden.

718 Tine, chopped off. L 102mm. WB.C14/5, Cell 14, floor. Period B2.

719 Tine, chopped off. L 94mm. WB.u.s. Period B u.s.

720 Crown, chopped off, traces of polish? L 103mm. WB.CA/1, Cell A, backfill. Period B u.s.

721 Tine, split fragment. L 45mm. WB.CA/3, Cell A, midden below floor. Period B midden.

722 Tine tip, sawn off, tip broken. L 41mm. WB.CC/3, Cell C (south of). Period B u.s.

724 Tine, end trimmed, other end broken. L 95mm. WB/108, entrance backfill. Period B u.s.

766 Beam, fragment. L 63mm. WB.EE/2. Period B midden.

768 Beam, tines and burr, shed, end chopped. L 244mm. WB.CI/6, Cell I, below floor I. Period B2.

Discussion

The points, pins, needles and spatulate points all share features in common, being essentially piercing implements. It is not always possible to distinguish functions amongst this group but some comments can be made. There is a surprising lack of decorative pins in the assemblage compared to other Hebridean sites. Only three possible pins are listed (616-618) and all are plain, being distinguished from the 'points' in being smoothed all over. All are from period B2. Some of the 'points' may have functioned as pins but most seem to have been used as piercers, awls or pegs. The larger and blunter points (606, 622, 623) in particular may have functioned as pegs or even pin beaters and 658 may have been a wedge (*cf* MacGregor 1985, 57, fig 34). 765 appears to be a miniature point or peg of some kind but no parallels can be cited. The perforated points (612-614) are needles of various kinds. The two larger examples (614, 615) can be paralleled from Phase I at A' Cheardach Mhor (Young and Richardson 1969, fig 7,6); Foshigarry (Beveridge & Callander 1931, fig 19,16-24); and Kilpheder (Lethbridge 1952, fig 4,5).

The three objects listed as spatulate points (627-629) are of unusual form and appear to be functionally related. They may be potting tools, used for smoothing and decorating pottery. All three, particularly 629, are well made objects and have had much usage. It may be significant that all three were found in pits and do not appear to be casual losses. A very similar object comes from Foshigarry (Beveridge & Callander 1932, fig 22,9), and another possible one was found at Bac Mhic Connaln (Beveridge & Callander 1932, fig 13 lower).

The remainder of the points are a miscellaneous collection. Some are merely convenient splinters picked up and used (624, 666, 667, 670, 757) while others are more carefully worked. Two examples (625, 667) are metatarsals split across the middle, of a type tentatively ascribed by MacGregor (1985, 174) as leather working tools. All these points can be paralleled at numerous Hebridean sites.

The bone pegged plates(630-634) are a coherent group of objects all of similar size and shape, except 633 which may be unfinished or a rejected piece. All have been attached to some other object along the flat surface. From their size and form (particularly the bevelling of the ends seen in 632) they resemble the side plates for the double-sided composite bone combs characteristic of the late Roman and Post-Roman period. However, there are no signs on any of these plates of any saw marks indicating that teeth were being cut after the comb was assembled, as 'invariably' happened (MacGregor 1985, 74). There are also no loose teeth or teeth plates, or indeed combs of any kind, from either structure. The pegs being placed at the corners of 630 would also seem to preclude the use in a composite bone comb and the use of bone rivets to hold an iron tang seems most unlikely. Similar bone-pegged plates from the Broch of Burrian were described by MacGregor (1974, 78, fig 9, 130-1) as possibly decorative mounts on wooden objects, and distinguished from bone knife-handle plates. However it is difficult to explain the similarity in size of the Sollas plates in terms of 'decorative mounts' and their function must remain dubious.

The three handles (635-637) are of normal type where the tang is forced into soft cancellous tissue of an antler. 635 has a rectangular socket which may indicate a knife tang. All three have circular sockets which may be for other tools such as awls, but it is difficult to imagine that a circular sectioned tang would not allow the tool blade to rotate in use. The phallic appearance of 637 could well be deliberate (*cf* MacGregor 1985, fig 88 for a Roman example).

The multi-socketed object 638 is obviously part of some complex device. The wear and handle shape show that it was partly hand-held. The apparent wear at the base of the end socket suggests some sort of turning function. The recessed transverse hole is difficult to explain even if it is a secondary addition. The object

was broken in antiquity and shows the typical patina of long use. Foxon (1981, 6) suggests a use as a door-latch of some kind, though admitting it is over-complex for such a function. The other sockets 689 and 671 , also seem to be handles of some kind with a similar recessed transverse holes. The red pigment on the surface of 689 may not be an original feature, but it may be related to the crushed hematite in the large vessels found in the same area. It could be suggested that these handles came from drills or augers, possibly from bow drills.

Two objects, 639 and 668, are described as bobbins or toggles. The perforated example 639 belongs to a common type from the Iron Age to Medieval periods. They have been interpreted as clothing toggles, playthings or wool bobbins (MacGregor 1985, 102-3). This last seems likely for the Sollas example given the polish on the shaft and the lack of wear on the central hole. 668 may be a bobbin but lacks any wear; another possibility is that it is a sheep-bit to prevent lambs suckling (MacGregor 1985, 184)

The group of items described as pivots (640-652, 710) belong to a class of objects commonly found in western and northern Iron Age sites. Originally described as quern handles (Young and Richardson 1960, 166) these have been more recently suggested to be perhaps bow drills or thong stretchers (MacGregor 1974, 76). The Sollas group throws some light on the function of these objects. As Foxon (1981, 4) has pointed out some of the Sollas examples are too small or too short to have served as quern handles though it seems possible that the larger ones were used in this manner. Most of the Sollas examples appear to have been discarded when wear exposed the soft cancellous tissue in the centre of the antler and the wear marks show a progressive movement narrowing along the shaft towards the break. Most also appear to have been cut to a precise length, for example the tips of the tines on 710, 643, 640 have been removed. This would seem to be unnecessary if these were handles. Close examination of the worn surfaces shows tiny fragments of minerals embedded in the worn surfaces of some, suggesting that they were being worn by rotating stone. It can be tentatively suggested that some of these

smaller examples were central pegs for holding the lower stone of a rotary quern in place or were door pivots while others were in fact quern handles. The smallest, such as 642, may have had some other function. 652 could have been a thong stretcher as the wear is different in extent to the others. Examples from other sites are definitely worn in the middle rather than the ends. It is clear that these pivots served a variety of uses which only close inspection will resolve.

Two objects are described as possible gaming pieces. 653 is a composite peg which must have been inserted in a board. 664 is a small highly worn tablet which could have no utilitarian function. It may have been used in a throwing game or in some kind of divining.

654 is part of a whalebone vessel and 655 is presumably another abandoned in manufacture though it may have been used before or after as a chopping block. Parallels come from the broch levels at Clickhimin (Hamilton 1968, fig 48, 5) and A' Cheardach Mhor (Young and Richardson 1960, fig 8, 19-20). Hollowed out vertebrae were also used at A'Cheardach Mhor set in the floor (*ibid*, 147). The excavators considered these were post-bases, but it is difficult to see why such elaborate settings were necessary.

660 and 723 have been used for polishing or burnishing. 660 is similar to the spatulate tools 628, 629 and may have been used in pottery manufacture.

The whalebone objects include a series of chisel-ended wedges. One of these is complete (661) and has transverse grooves which are probably an earlier attempt to cut the block into small pieces. The other three (737, 747, 751) can be identified by comparison with 661. These seem to have been used as splitting wedges, perhaps on bone rather than wood but the form is unparalleled (see also 638). Two pieces with notches, 657 and 659, may have been pegs of some kind. 665, described as a ?stake appears to have been hand held but the functional end is missing.

There are three examples of cattle scapulae which have utilised but not worked in any way 758, 762, 763. Scapula are commonly used because of their shovel-like form (MacGregor 1985, 179). The shovelling of sand would have been a constant problem on the machair sites.

In addition to the worked bone objects there is a large quantity of both antler and whalebone debris. The whale-bone material (725-756) consists mainly of rectangular blocks and plates, and a variety of these are illustrated. The material appears to have been worked by splitting the bones lengthwise (perhaps with the whale-bone wedges) into a number of strips, then sawing the lengths into small sections. A group of five segments all from the same bone came from EE/I, and two of the pieces can be rejoined (732, 733). The antler-working debris is more varied and seems to fall into three groups: a) discarded tines and tine tips sawn or chopped off; b) sections of antler beam; c) split fragments. Some of these, especially of group c) may be merely broken objects, but some appear to be the result of longitudinal splitting which has gone wrong (732, 733).

Use of material

Table 12 shows the relative numbers of objects and debris from the three classes of bone used on the site: whalebone, antler and bone. A number of general points can be made from this data concerning the choice of material at different periods. Whalebone artefacts are entirely absent from Site A, though whalebone was noted from the animal bone assemblage. On site B, Tables 14 and 15 show that most of the cetacean objects and debris belong to the midden phase lying outside the entrance passage in area EE. The relationship of these particular midden deposits to the wheelhouse is unknown but it is possible that they are contemporary with the B1 occupation rather than pre-dating it, as most of the other midden deposits appear to be, as a number of the characteristic cetacean plates of EE are also found in the B1 levels in the wheelhouse (753, 754).

Whichever is the case, whalebone objects are sparse in later occupation of the wheelhouse (B2) suggesting only residual or re-used whale bone was used. Thus it seems likely that the use of whale bone was dependent on access to a carcase and that this was an intermittent event in the life of the community. The concentration of whale bone debris in area EE, with corresponding concentration of antler debris in area EN (Table 15) perhaps indicates a spatial separation of working areas. The actual whale bone debris in area EE is unusual in several respects. Firstly it is composed mainly of unused 'blanks'; these are semi-finished pieces, cut into size and sometimes trimmed to shape, but never used. A number of pieces have obviously been cut from the same bone and two of these can be rejoined on their sawn edges (732, 733). All of the cetacean bone has been cut with an iron saw, in contrast to much of the antler. All these points suggest that some kind of specialised craft activity was taking place here, rather than 'domestic' scale production. Whale bone was a valuable resource and it is possible that items were being produced for redistribution.

Both antler and bone were used at all periods on both sites, but there seems to be a trend towards more use of bone implements in the later phases of WB. This may reflect a growing scarcity of antler as a resource, or it could be a function of the types of object found in the two structures. Table 13 shows the relative abundance of each class of artefacts. The figures for all phases of sites A and B have been amalgamated as so few objects are involved. Even so it is doubtful if there is any statistical difference between the two sites given that twice as many objects were found on site B. There may be proportionately more points on site B and this may in part explain the predominance of bone over antler on this site, as antler is less suited to making points. Despite this qualification there does seem to be a shift to a predominance of bone over antler through time.

Working techniques (Table 14)

A numbe. of iron tools seem to have been available for bone working. As already mentioned saws were used to prepare almost all the cetacean material while antler was normally chopped. This may reflect different working properties of the two

materials but it is clear that an iron saw would be a valuable tool and its use may have been restricted. Saw cuts are found from the earliest period to the latest on antler. One saw cut (between 732 and 733) can be reconstructed as being 2mm wide. The bones were rotated during sawing to prevent the blade sticking and were then separated by breaking. The chopping of the ends of antler in particular seems to have been done with a fine axe or adze. The splitting of the bones, antlers and whalebone may have been done with iron chisels, but the whalebone wedges found in area EE illustrate an alternative method, comparable to the antler wedges used at Hedeby (MacGregor 1985, fig 34). Knives appear to have been used to trim all three classes of bone object and also to cut many of the perforations. Drills, presumably of iron, were available, as shown by the drilled holes in the pegged plates 632-634, but the rarity of use is striking. Polishing and grinding may have utilised pumice or some local stone. The traces of red pigment on two objects 689, 713 may be decorative or perhaps show the use of hematite as a polishing powder (jewellers rouge is hematite).

TABLE 12 Worked Bone: Bone type by period

PERIOD	OBJECTS			WORKING DEBRIS	
	Antler	Bone	Whalebone	Antler	Whalebone
B u.s.	3	3	1	10	1
B2	3	17	2	7	1
B1	4	5	2	-	2
Bmidden	5	2	7	13	26
B Total	15	27	12	30	30
A u.s.	6	5	-	6	-
A2	7	2	-	10	-
A1	-	-	-	1	-
A Total	16	7	-	17	-

TABLE 13 Numbers of bone artefacts by type and site

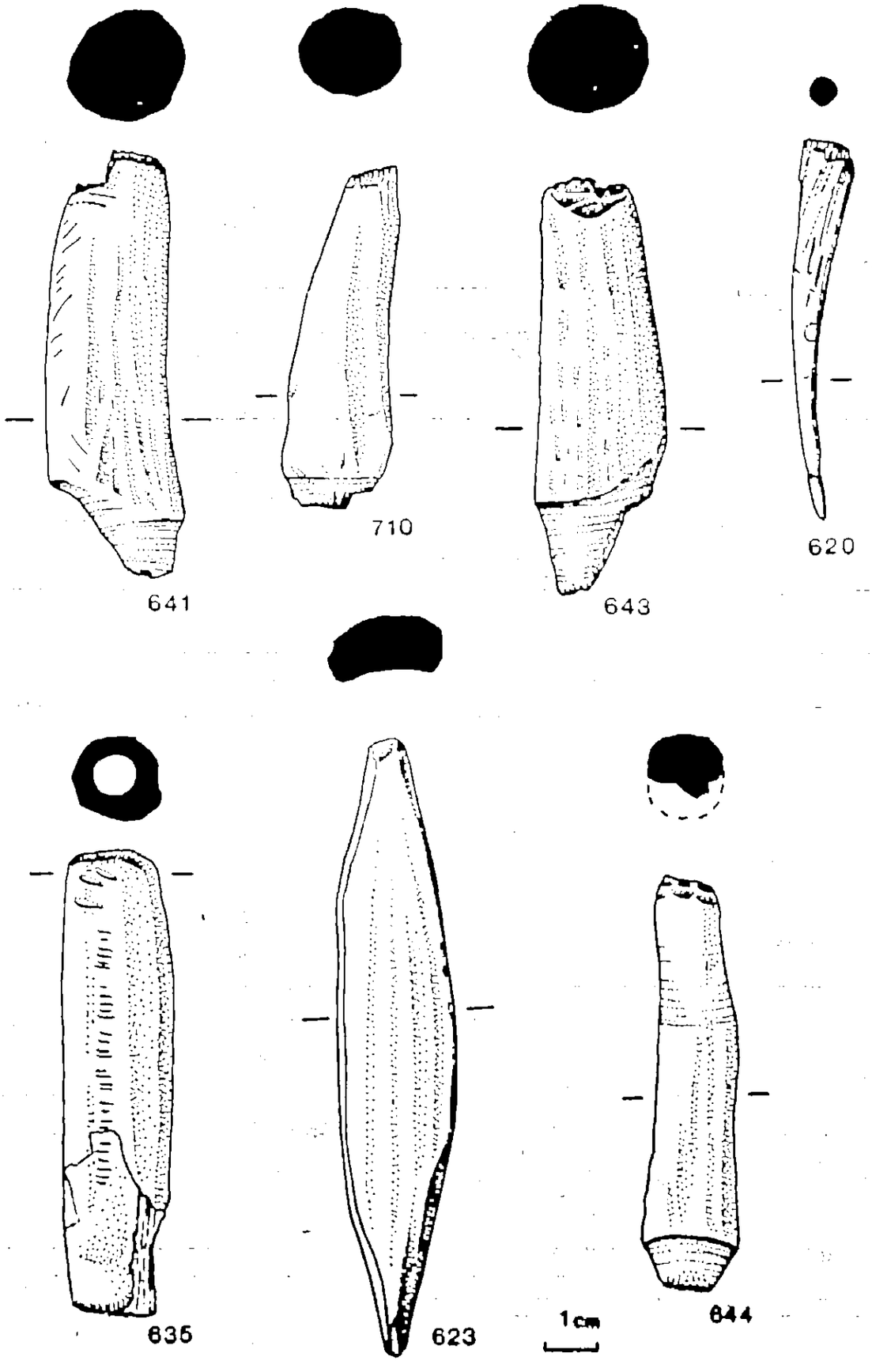
TYPE	Site A	Site B
Point	6	19
Pin	-	3
Needle	3	1
Spatula	-	2
Potting tool	1	2
Pegged plate	3	2
Handle	1	2
Socket/handle	2	1
Bobbin	-	2
Pivots	6	8
Gaming pieces	-	2
Vessel	-	2
Polisher	-	2
Notched	-	3
Wedges	-	4
Shovel	3	-
?Stake	-	1
TOTAL	25	56

TABLE 14 Method of bone cutting by period

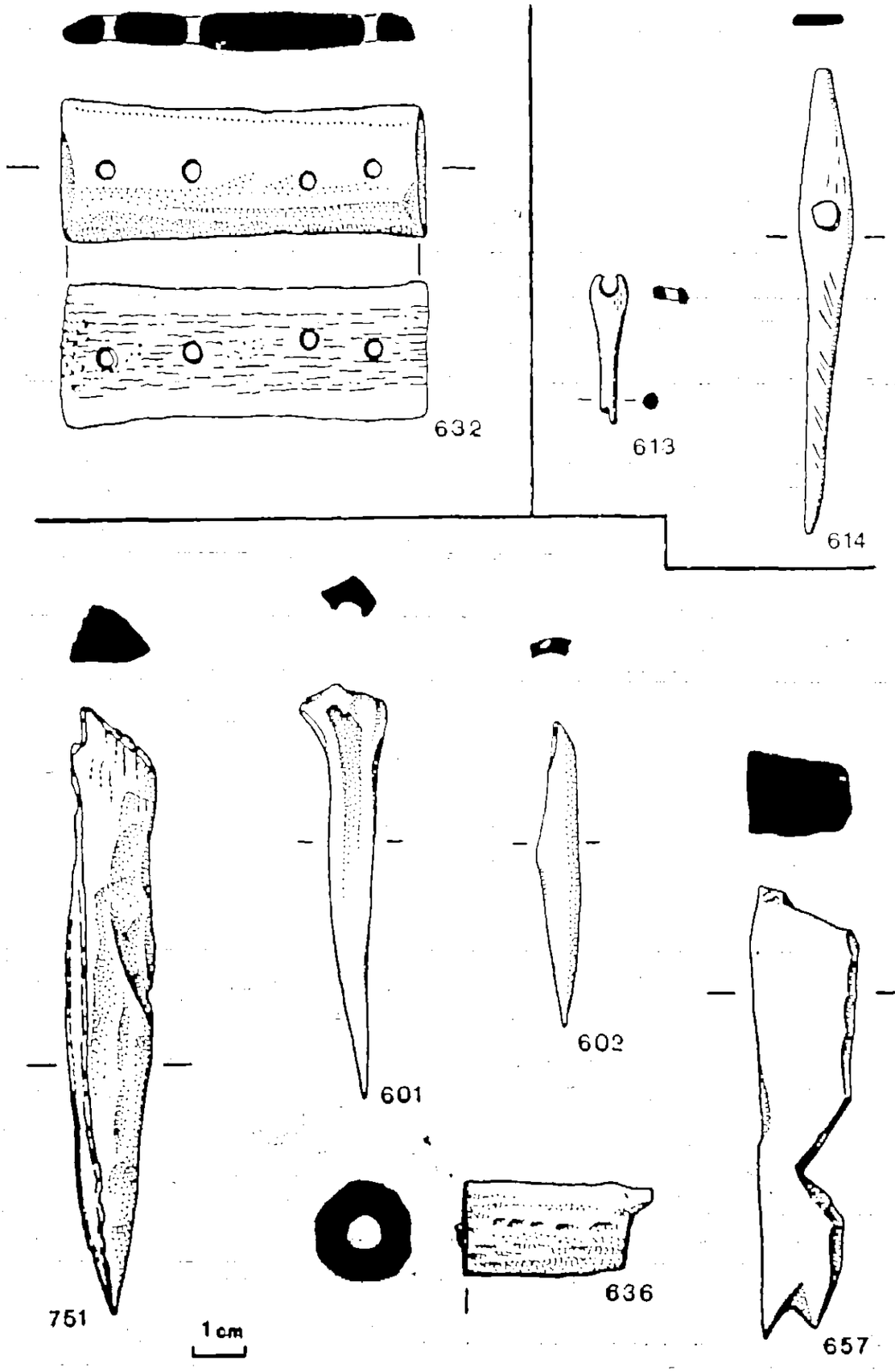
PERIOD	ANTLER		WHALEBONE	
	Sawn	Chopped	Sawn	Chopped
B u.s.	1	7	1	-
B2	1	3	-	2
B1	-	-	2	1
Bmidden	8	5	20	1
A u.s.	1	5	-	-
A2	1	11	-	-
A1	3	-	-	-

TABLE 15 Bone working debris on Site B by area

AREA	ANTLER	WHALEBONE
EE	3	21
EN	5	1
ES	1	2
SC	1	1
Cell A	2	-
Cell C	-	1
Square 13	1	1
TOTAL	13	27

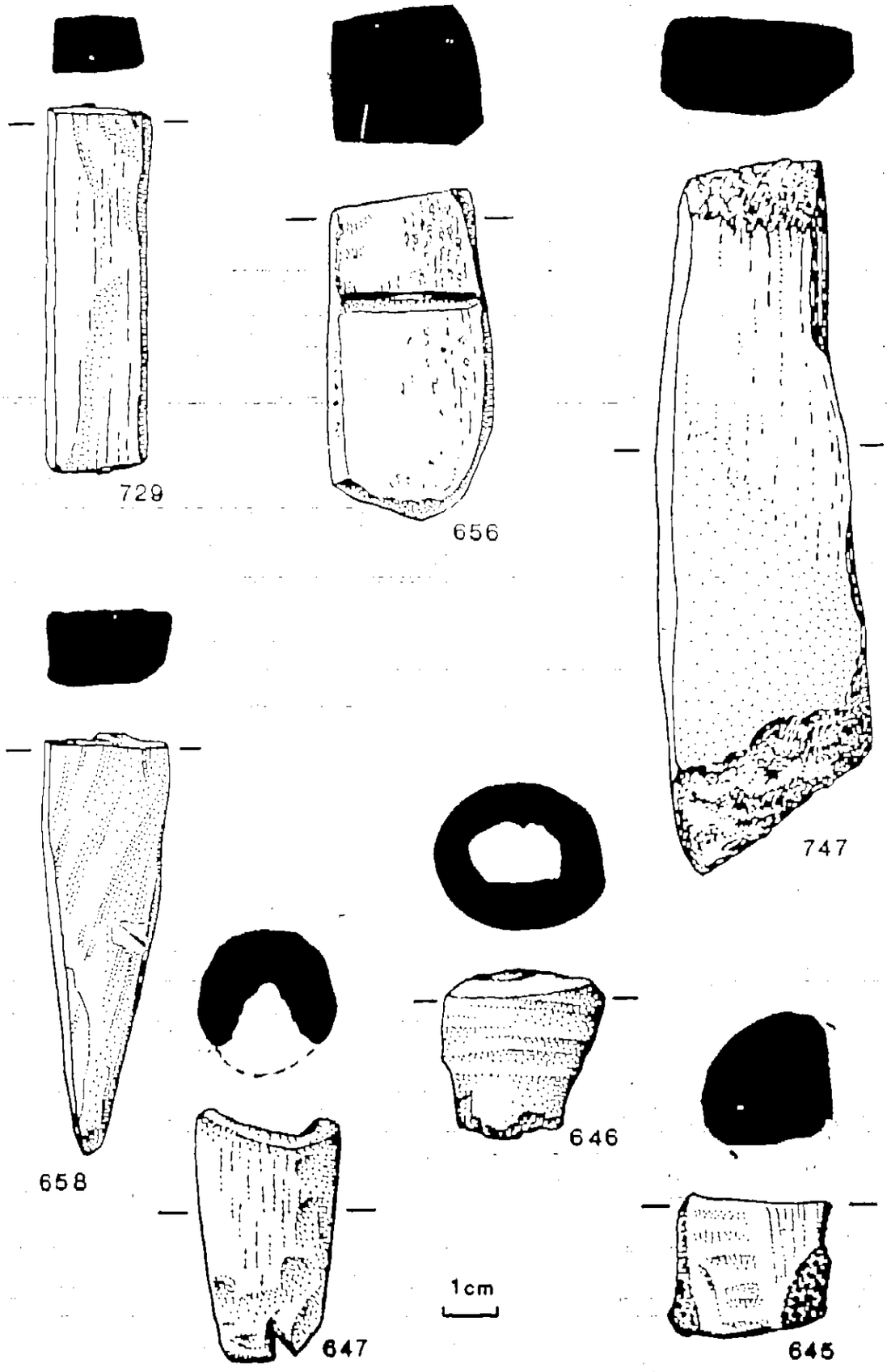


ILLUS 65 Worked bone from Site A, Period A2: antler *620, 623, 635, 641, 643, 644, 710.* Scale 1:1.

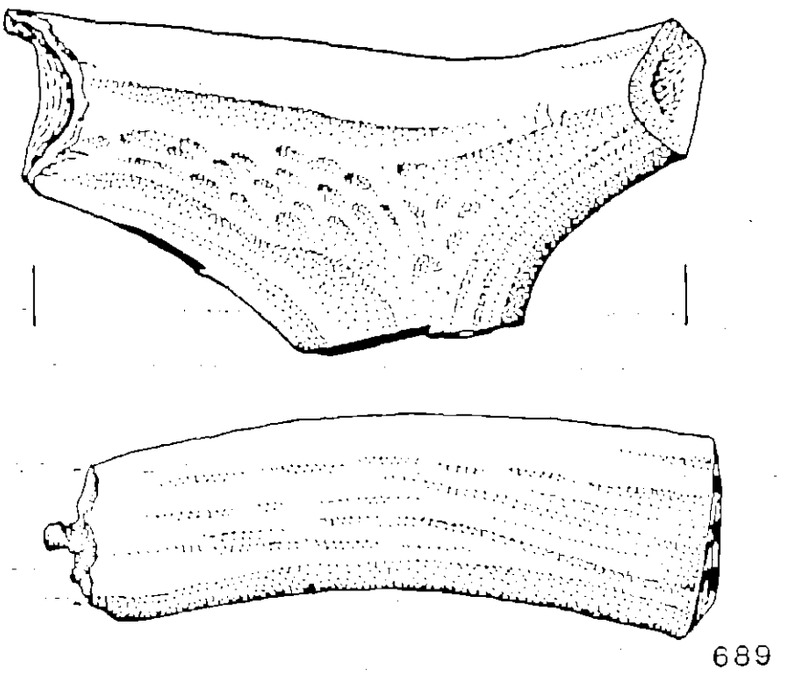


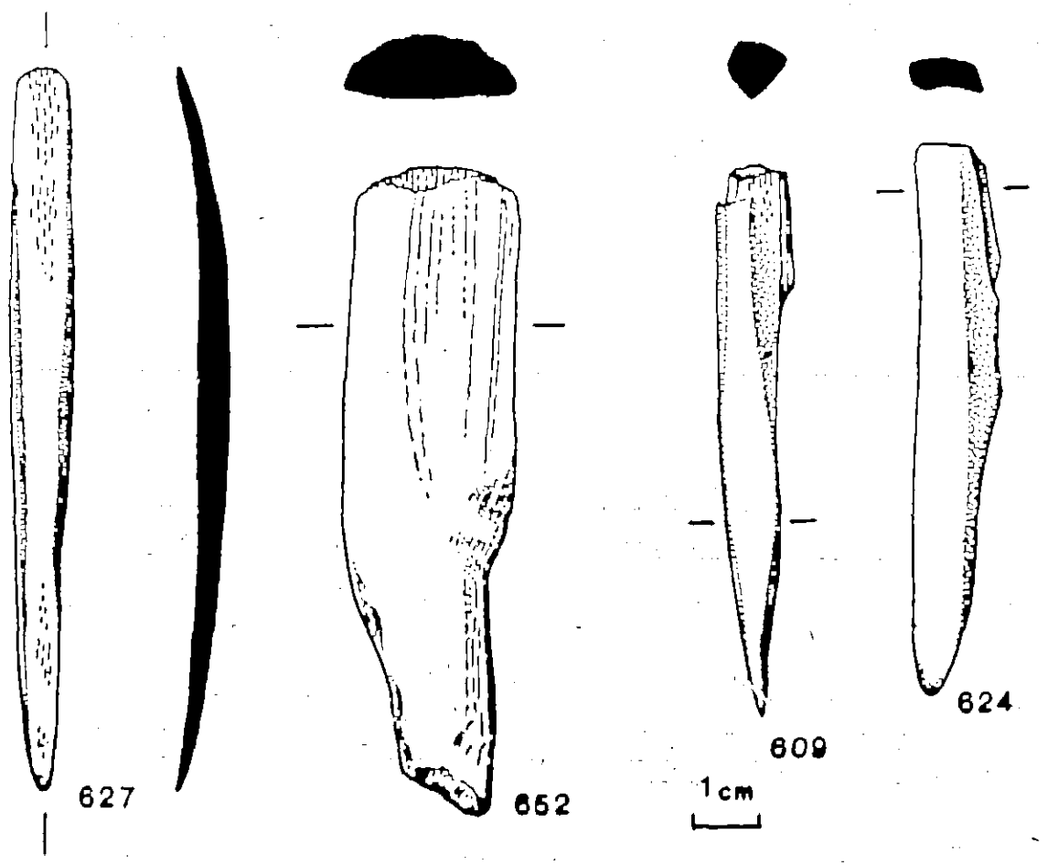
ILLUS 66 Worked bone from Site A and Site B middens. Period A2: antler *632*. Site A unstratified: bone *613*, *614*. Site B middens: bone *601*, *602*; antler *636*; whalebone *657*, *751*. Scale 1:1.

3 : B14

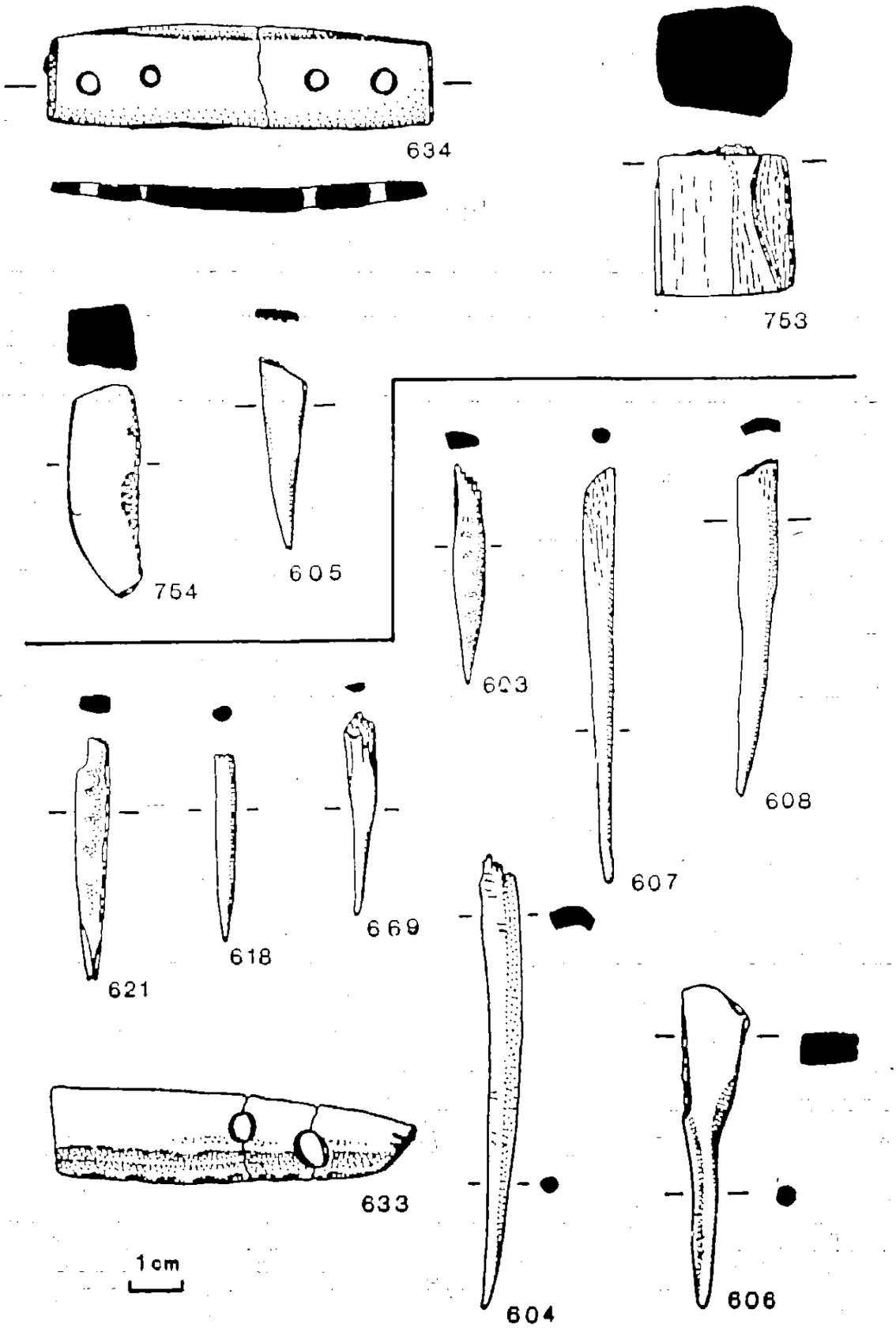


ILLUS 67 Worked bone from Site B middens: antler *645-647*; whalebone *656, 658, 729, 747*. Scale 1:1.

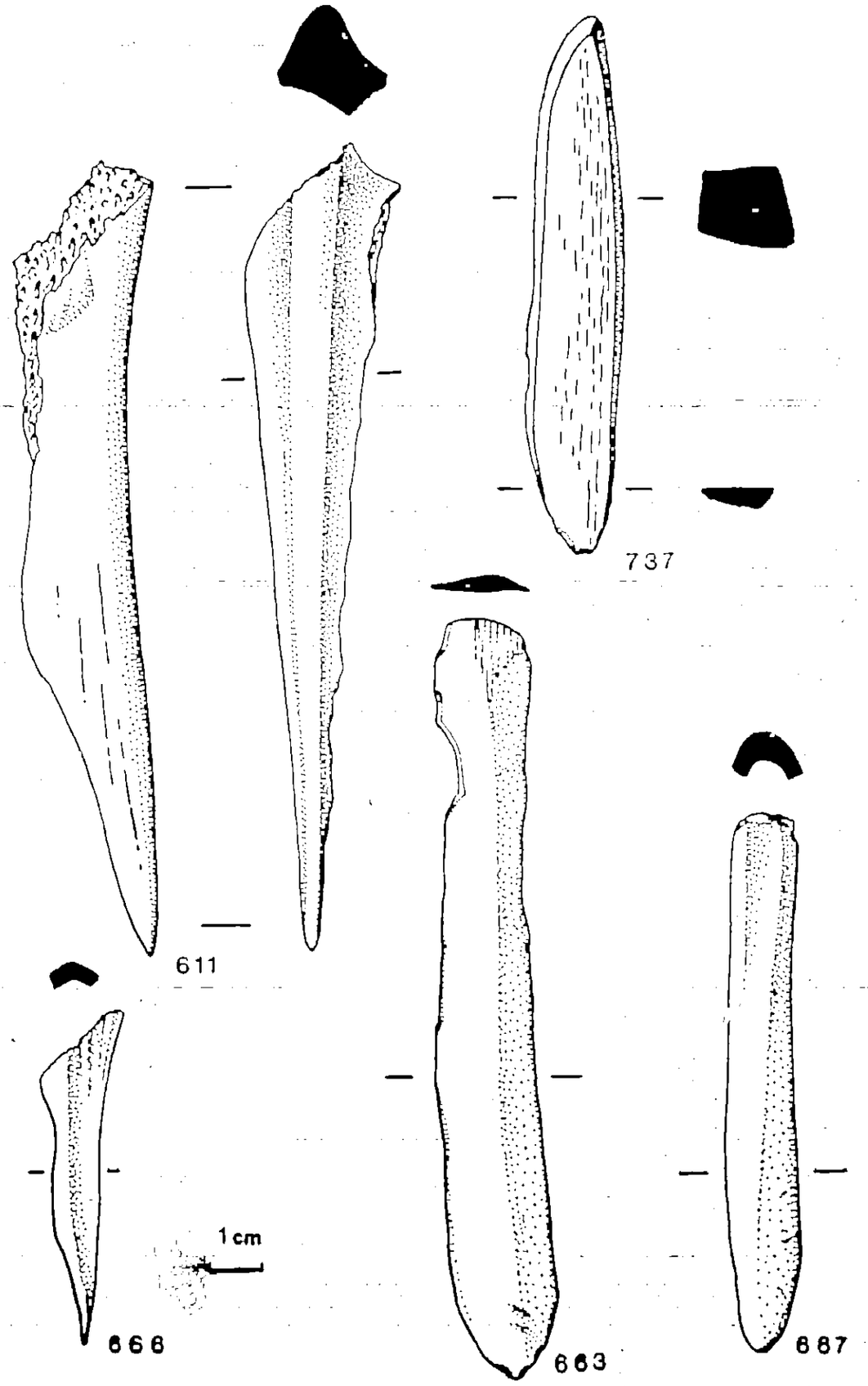




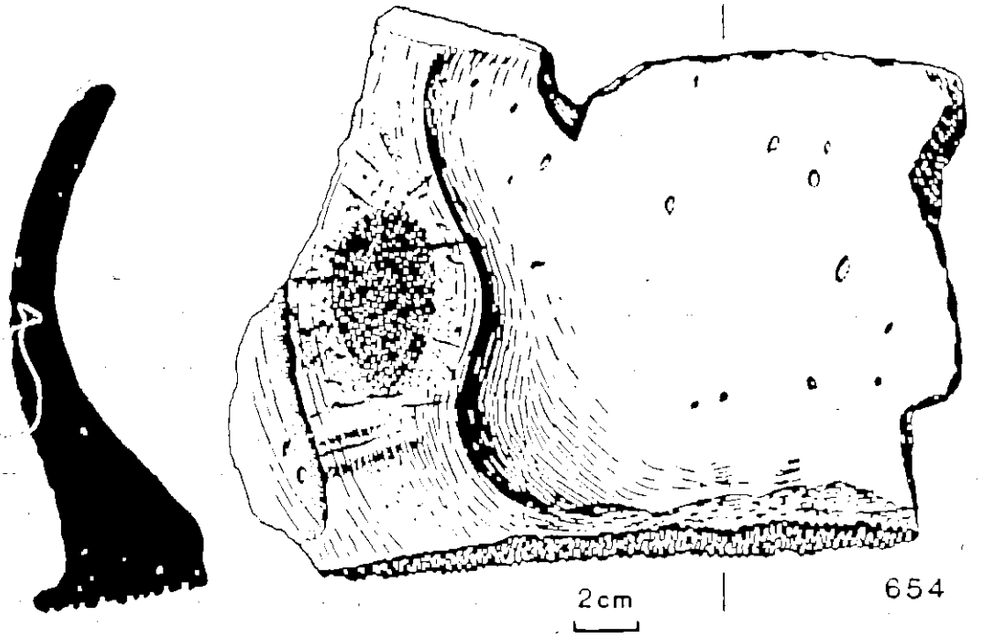
ILLUS 68 Worked bone from Site B. Middens: antler *689*. Period B1: bone *627*, *624*; antler *652*; whalebone *609*. Scale 1:1.

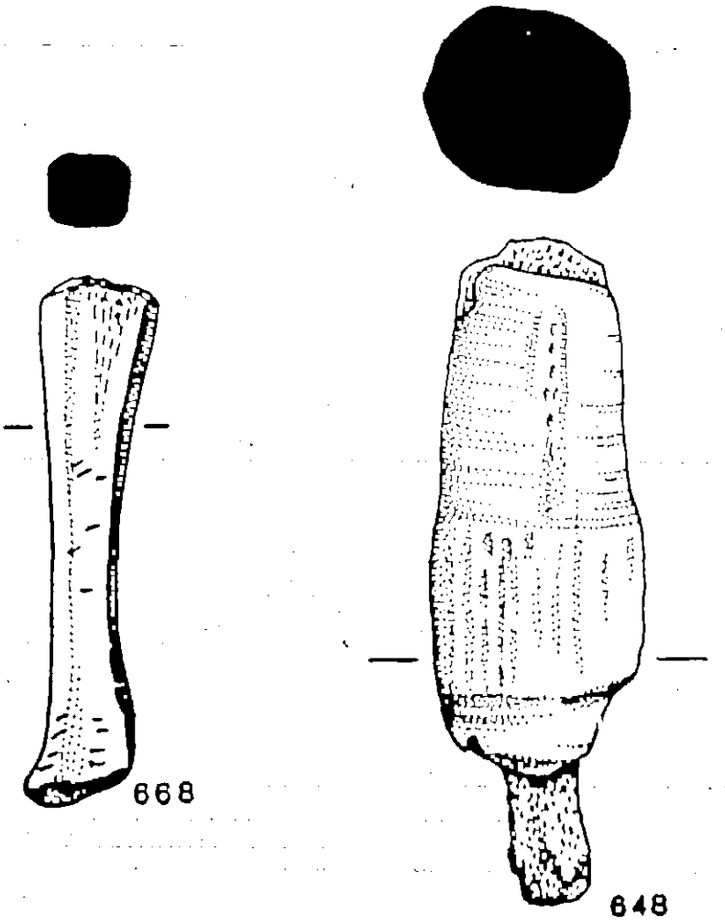


ILLUS 69 Worked bone from Site B. Period B1: bone *605*; antler *634*; whalebone *753, 754*. Period B2: bone *603-4, 607-8, 618*; antler *621*; whalebone ?*606*. Scale 1:1.

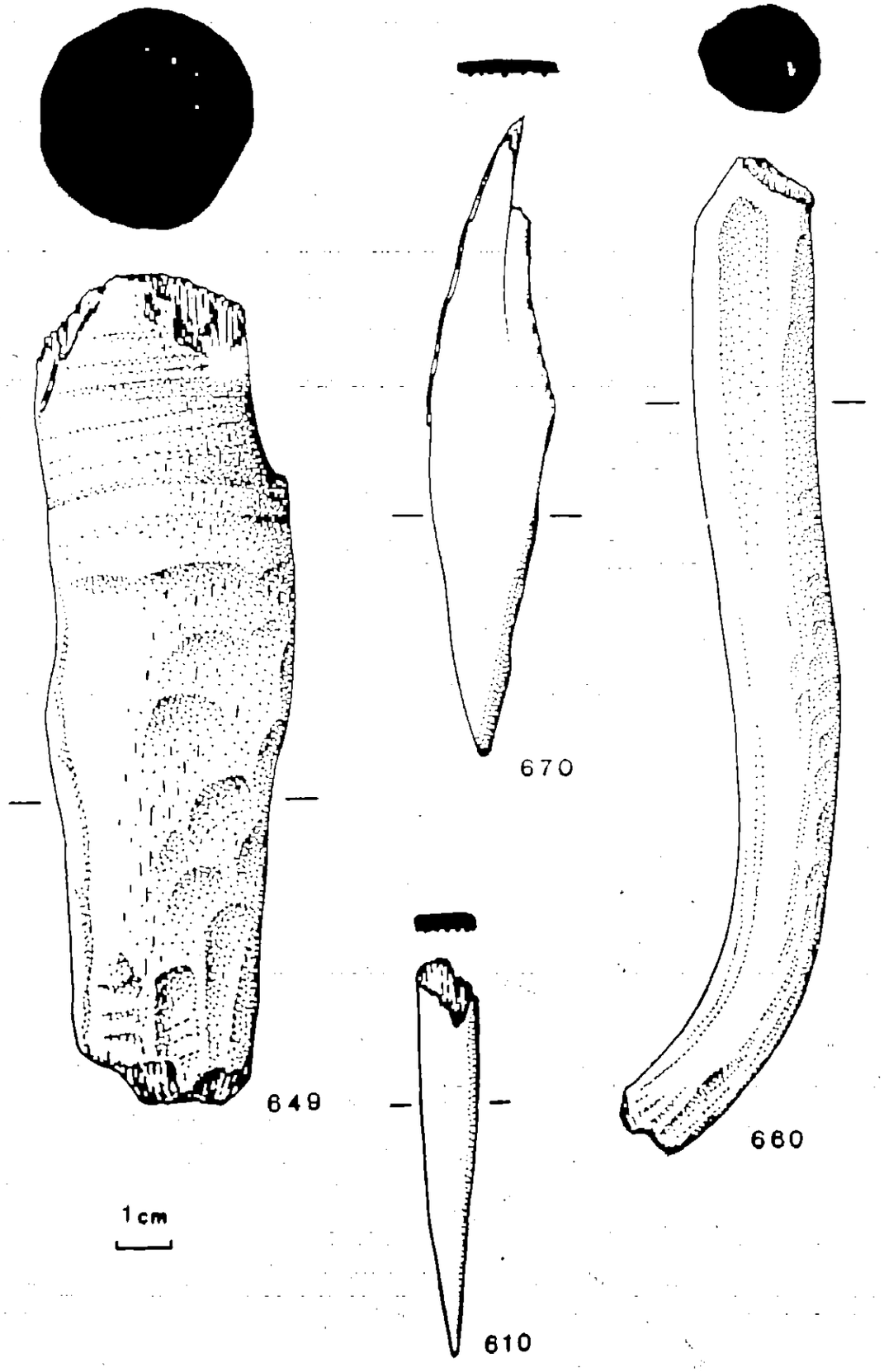


ILLUS 70 Worked bone from Site B. Period B2: bone *611, 663, 666, 667*. Site B midden: whalebone *737*. Scale 1:1.





ILLUS 71 Worked bone from Site B. Period B2: bone *668*; antler *648*; whalebone *654* (at 1:2). Scale 1:1. 3 : 05



ILLUS 72 Worked bone from Site B unstratified: bone *610, 670*; antler *660*; whalebone *649*. Scale 1:1.

MISCELLANEOUS FINDS

These comprise all the finds apart from the pottery and worked bone described above. The few organic finds which were not animal bone are included. The sequence of each entry is: finds number; description; dimensions; comments; context number; context description; period.
* indicates object is illustrated in the main report.
D diameter L length T thickness W width.

CATALOGUE

Metalwork: Iron

503* Ring with bezel-like protrusion. Lapped joint on one side. D *c.*25mm. T *c.*3mm. WB.C5/6, Cell 5, floor 2. Period B2.

504 Twisted rectangular bar with both ends folded back along length. L 50mm. Badly corroded. WA/59, base of midden east of structures. Period A us.

505 Rod with disc-shaped terminal. Shaft D 8mm, L 23 mm, incomplete. Terminal projects from shaft. Possibly a stick-pin. WB.SW/10, Pit 3. Period B1

506 Hook. Flat rectangular-sectioned bar. L 20mm, W 5mm, T 3mm. WA/107, outlying midden west of site A. Period A us.

507 Triangular fragment from large object, 30 x 27mm, T 5mm. WA/73, centre of structure A, just above floor. Period A2

Metalworking evidence

497* Crucible, complete, bluntly conical, triangular in cross-section, with pinched pouring spout. Extensive bubbly vitrification all around the lip, with included copper corrosion products on interior. Most of the exterior is unvitrified. Fabric hard, grey, gritty, with much quartz and some fine organic temper. Inside were several large plates of mica (muscovite), deliberately placed but unheated. H 36mm, W *c.*50x52mm, T 5mm. The crucible lay on a bed of quartz fragments (527) with a yellow bead (513). WB.C9/6, Cell 9, Pit 4. Period B1.

498* Mould for a projecting ring-headed pin. Lower valve of a two-piece mould, broken at both ends. Flat lower surface and convex upper surface. Upper surface has the impression of a pin with a shaft of sub-rectangular section, 4mm wide, L more than 20mm. The ring head projects 5mm outwards from the shaft and is circular (incomplete), D *c.*22mm, with rounded section D 3mm. No signs of keying on the surfaces preserved. Mould T *c.*15mm. Fabric is pale orange, with abundant inclusions of gneissic minerals up to 2mm. WB.35/2, northwest quadrant of square 35. Period B midden

499 Crucible fragment. Rim of small crucible *c.*20mm high, shape unknown. Fabric is fired but not vitrified -?unused. Fabric as pottery from site. WB.C12/2, Cell 12, floor 1. Period B2

500 Stone with vitrified surface. L 30mm. WB.35/4, square 35, southeast quadrant. Period B midden.

501 Slag, probably smithing debris. L 31mm. WB.S/1, south of WB, top of midden. Period B midden.

502 Slag, large piece of ?tap slag. L 49mm. WB.S/1, south of WB, top of midden. Period B midden

Other pieces of slag and 'clinker' are mentioned , particularly fro: Site A but none have been preserved.

Glass

511* Egyptian blue pigment. Triangular rod of opaque bright blue mineral with rubbed down surfaces. L 13mm, W 8x8mm. WA/32, northeast side of central area, floor. Period A2.

513* Bead. Small annular glass bead of opaque yellow glass. Flattened shape around perforation characteristic of Guido's Class 8. Has an inner lemon-yellow portion with an outer, more orangey-yellow, bubbly layer wound round it. D 6mm, D hole 2mm. WB.C9/6, Cell 9, Pit 4, with 497 and 527. Period B1.

Ceramic objects

103 Disc, broken in half, cut from potsherd, edges rubbed down. D *c.*50mm. WB.C7/1, Cell 7, floor. Period B2.

153* Disc, complete, roughly cut from potsherd. D *c.*45mm WB.C13/9, Cell 13, below floor 2. Period B1.

483 Whorl. Sub-circular, roughly cut from potsherd. Hole not central, D 7mm. Broken and incomplete. D *c.*55mm. WB.22/1, on top of wheelhouse outer wall. Period B us.

484 Whorl. Sub-circular, roughly cut from vessel sherd. D *c.*40mm. T 8-9mm. Hole central, D 8mm. WB.W/1, floor by 'well'. Period B2.

Stone objects

485 Whorl. Sub-circular, perforation off-centre, hour-glass shape. A shallow groove *c.*3mm wide runs straight across one face and is cut by the perforation. Rock is a lithified shell-sand, very soft. D *c.*52mm, T *c.*9mm. perforation D 6mm. WB.C12/3, Cell 12, floor. Period B2.

486* Whorl. Sub-circular, large central hole, hour-glass shape. Carbon deposits around one end of perforation. Edges rubbed smooth in short flat sections. Rock is lithified shell-sand. D *c.*35mm, T 12mm, perforation D 9mm. WB.C6/21, Cell 6, floor 2. Period B2.

487* Square plaque with central perforation. Decoarated on one face with two diagonal shallow grooves 1-2mm wide. other face has one faint diagonal groove, a groove along one margin and an intermittent circular groove around the perforation. Rock is lithified shell-sand, compact. 53x55mm, T 15mm, perforation D 4mm. WA/40, central area, just above floor, near wallface. Period A2.

488 Hammerstone. Oval quartzite pebble, battered at both ends. One surface shows signs of use as a polisher. 63x57mm. WB.35/1, square 35, blown sand. Period B us.

489 Three quartz pebbles, irregular angular shapes, about 20mm across. WB.C8/13, Cell 8, Pit 2. Period B1.

490 Disc, sub-circular, formed by rubbing the edges of a flat pebble. 47x51mm, T 8-15mm. WB.EN/3 Period B midden.

491 Hammerstone. Sub-spherical pebble battered at both ends. Burning on one face. D *c.*60mm. WB.SW/us. Period B?2.

492 Fire-cracked pebble, originally used as a polisher. 60x58x25mm. WB.C8/13, Cell 8, Pit 2. Period B1.

493 Polisher/rubbing-stone. Cylindrical pebble of red sandstone, both ends ground smooth through use as a rubber. Central area used for polishing - glossy with black deposits. 80x65x45mm. Unstratified.

494 Four 'pot-lids' were found stacked vertically on the floor of Cell 7, between Pits 1 and 13. D.80mm. (missing). Period B2.

495* Hammerstone. Oval pebble battered at both ends. Gneiss. 75x50x40mm. WB.C7/us, Cell 7. Period B?2.

496 Quern. Upper stone of rotary quern with central perforation. c 500x400mm, possibly broken. Lay embedded in floor just in front of pier 6/7, SW quadrant, covering a cavity (?Pit 6), with potsherds covering the central hole. (missing). Period B2.

508* Pumice. Dark grey rectangular block with one corner broken off. One surface flat and abraded from use as rubbing-stone. 65x40x23mm. WB.S/1. Period B midden.

509 Pumice. Irregular piece with one edge used for rubbing. 50x75x22mm. WB.35/5. Period B midden.

512 Cube of jet or bituminous shale, water worn, unused. WB.ES/1. Period B midden.

514 Part of another broken rotary quern is marked on a plan in Pit 25, SW quadrant. (missing). Period B1.

515 Slab of lithified shell-sand, unused raw material. WB.C7/18, Cell 7, blown sand below floor 1. Period B2.

516 Two pieces of black pumice. Unused. L 70, 45mm. WB.EN/5. Period B midden.

517 Two pieces of soft black pumice. Unused. L 55, 22mm. WB.13/7. Period B midden.

518 Pumice tephra. Unused. L 18mm. Square 61/1. Midden.

519 Pumice. Unused. L 28mm. WB.CA/4, Cell A, below floor. Period B midden.

520 Pumice. Unused. L 30mm. WB.13/4. Period B midden.

521 Pumice. Unused. L 27mm. WB.13/3, backfill. Period B us.

522 Pumice. Unused. L 18mm. WB.35/3. Period B midden.

523 Pumice. Unused. L 30mm. WB.C3/1, Cell 3, floor. Period B2.

524 Pumice. Unused. L 20mm. WB.35/2. Period B midden.

525 Pumice. Unused. L 34mm. WB.13/3, backfill. Period B us.

526 Pumice. Unused. L 30mm. WB.13/1, backfill. Period B us.

527 Quartz fragments, 12. 10-20mm. Angular white vien quartz. Formed by crushing a small pebble as shown by occasional rounded faces on the fragments. These lay below the cruciblo 497 and bead 513. WB.C9/6, Cell 9, Pit 4. Period B1.

Organic Material

Charcoal

530 Small group of oak (*Quercus* sp.) twigs. D *c.*5mm. Sent for ^{14}C determination. WB.C7/32, Cell 7, Pit 9. Period B1.

531 Fragment of large ?cut timber. T 15mm. L 30mm. WB.C3/1, entrance, floor. Period B2.

532 Twig. L 25mm, D 5mm. WB.C4/2, Cell 4, floor. Period B2.

533 Twig. L 21mm, D 5mm. WB.C7/3, Cell 7, sand below floor 1. Period B2.

Although charcoal is mentioned several times in the finds register for Site A, none appears to have survived.

Other carbonised material

534 Carbonised ?woody mass, 25x15x10mm. WB.C9/21, Cell 9, Pit 13. Period B1.

535 Patch of organic material, unidentifiable but reed-like, lifted and consolidated. Described as "patch of thatching material" in site book. Lying on floor, north side of central area. Period B2.

Shell

536 Mass of burnt shell. 50x45x15mm. ?modern. WB.13/1, backfill. Period B us.

537 *Pecten* sp. complete valve. WB.S/3. Period B midden.

538 *Ostrea* sp. Abraded fragment of valve with bored surface. WB.13.23/2, backfill. Period B us.

539 *Patella* sp. valve with perforated umbo. WB.C1/3, Cell 1, floor. Period B2.

540 Sea-urchin, fragment of shell. WB.C6/6, Cell 6, floor 2. Period B2.

MISCELLANEOUS FINDS

1. Exotic artefacts

Apart from the pottery and worked bone discussed above the finds were few and generally undiagnostic, but there are a small number of items of some significance for the chronology and status of the site.

Iron ?finger-ring

One of the most intriguing of these artefacts, 503, from the floor of Cell 5, is an iron ring which superficially resembles a Roman type of finger-ring with a bezel, which were used as seal rings. If the ring is indeed a Roman artefact it would belong to Henig's Type III, which he suggests is confined to late 1st- or early 2nd-century contexts (Henig, 1978, 36). Such an item would be most unlikely to have found its way to North Uist before the Roman occupation of Scotland in the AD 80's, and would be most likely to date to the early 2nd century when Roman artefacts begin to penetrate as far west as the Hebrides (Robertson 1970, figs 1 &2). The ring would therefore provide a more precise *terminus post quem* for the B2 phase of wheelhouse occupation than the ^{14}C dates. Unfortunately, detailed examination of the ring throws some doubt on this identification. The apparent bezel partially encloses an organic inclusion, probably a grass stem, and may therefore be purely a corrosion blister. The interior metal of the ring has completely corroded away, making it impossible to be certain of the original form. Another unusual feature of the ring is that it has a lap joint on one side. This gives the ring the appearance of an incomplete spiral structure, but it is quite unlike the more open iron versions of Iron Age spiral finger-rings such as those from Glastonbury Meare Village (Bulleid & Gray 1953, pl 41). The main argument in favour of it being a finger-ring is that it is flattened on the inside. If it is a finger-ring then it is more closely related to Roman types than Celtic ones, which are invariably of the spiral type. There does not seem to any item of Iron Age Hebridean ironwork which is of similar form. It is therefore possible that the ring is a Roman ring, though it may not be as closely datable as was first imagined.

Rather surprisingly, Roman iron finger-rings were associated with the aristocracy in the Republic and perhaps later (Manning 1985, 78). Although a number of Roman finger-rings have been found in Roman forts in Scotland they are rare on native sites, with only one iron ring from Arthur's Seat and a silver one from the Culbin Sands (Henig 1978, nos 467, 99). The Sollas ring would be the only closely datable item from the excavations - indeed one of the few from any stratified deposit in a wheelhouse.

Yellow bead

The small yellow glass bead 513, from a pit in Cell 9, belongs to Guido's (1978) Class 8. The type is found widely on Hebridean Iron Age brochs, forts and wheelhouses. The origin and date of these beads has been the subject of much discussion (Guido 1978, 73-76; Ritchie and Lane 1980, 219; MacKie 1971, 48; Lane 1987, 53; Topping 1987, 72; Henderson 1988). The Scottish examples were probably made in the North-east at the Culbin Sands, and are not be contemporary with the English examples of superficially similar forms (Henderson 1988, 69-71). It is worth setting out the context of the Scottish beads in some detail as they appear to form a recognisable horizon in Hebrides.

In the Hebrides and adjacent coastal areas Class 8 beads have been recorded from 9 sites: 4 brochs, 3 wheelhouses, 2 duns and a cave. Three of these sites have no independent dating evidence or distinctive associated objects, excluding pottery: Kings Cave, Jura (Mercer 1978), Dun Troddon, Glen Elg (Curle 1921) and A'Cheardach Mhor (Young and Richardson 1960). Apart from Sollas this leaves five sites with some form of datable contexts for the beads.

At Dun Ardtreck a number of these beads, possibly from a necklace, came from the secondary use of the semi-broch as a dwelling (MacKie 1965, 8). Associated was a bead of Guido's Class 14 (Guido 1978, 200) and Roman pottery of mid to late 2nd- century date came from the base of this phase (ibid). Also associated were a spiral finger-ring and a projecting ring-headed pin. At Dun Mor Vaul nine

beads were recovered, including one from the base of the primary broch occupation (Phase Iota) (MacKie 1974, 147) and others from within the primary and secondary occupations (Phases Iota, Kappa, Mu). The Iota phase produced a piece of a glass vessel dated to AD160-250 (*ibid*, 148); other 1st- or 2nd-century Roman pottery and glass was found throughout the occupation layers containing the beads (*ibid*, 148, 155). A radiocarbon date from the broch construction layers of 1890 ± 90BP calibrates at 2 sigma to 100BC-AD340 providing no further refinement of dating (Lane 1987, 57). Associated objects include projecting ring-headed pins and spiral finger-rings. At Dun an Iardharch broch on Skye one Class 8 bead was found as well as beads of Classes 13 and 14 (MacLeod 1915, fig 10), which are dated by Guido (1978, 87-88) to the 1st and 2nd centuries AD. These beads were found in the central floor of the broch, separately from a necklace of Dark Age beads. From this broch came the terra-cotta model of a bale of Roman origin (Curle 1932, fig 2). Dun Cul Bhuirg, Iona also produced a Class 14 bead in the same context as Class 8 beads (Ritchie and Lane 1980, 219). The wheelhouse at Tigh Talamhanta, Barra produced three Class 8 beads including one from Phase II (Young 1953, 100). The only possibly datable object from this site was unusual bronze fragment described by Young (*ibid*) as possibly a Roman brooch of Aesica type. The lack of a catch plate makes it unlikely that this piece is from a broch and, though it is an exotic find and probably of Roman origin, it cannot be dated at present. The evidence from the Hebrides would thus point to a close association of Class 8 beads with Roman material of late 1st- and 2nd-century date and they are often found with other beads of the same period.

Outside of the Hebrides a similar dating seems likely. In eastern and midland Scotland Class 8 beads are also associated with Roman material: at Traprain Law they were commonest in the lowest levels of 1st- to 2nd- century date (Curle and Cree 1921, 198; Burley 1956, 122); one bead from Castlehill fort, Dalry was in association with samian and 2nd-century coins (Smith 1918) as well as Dark age material; at Inverkeilor one was found with a Type I glass armlet (Guido 1978, 180); and those from a necklace at Culbin sands were apparently associated with a

Class I4 bead (Guido 1978, 199). The other sites quoted by Guido (*ibid*, I8O-I82), including two Ayrshire crannogs and the Freswick broch, do not have reliable contexts. The only other wheelhouse site with Class 8 beads is Clickhimin, Shetland. Six examples were associated with the early wheelhouse occupation which also produced a Roman glass vessel of late 1st- or early 2nd- century date (Hamilton 1968, I33). Two others came from deposits on the shore outside the fort (*ibid*, 8O) in contexts which the excavator claimed to be associated with the preceding Iron Age fort. One bead was certainly overlain by a sherd of a mid-2nd to mid-3rd century glass vessel, but the dating of this phase of the site is controversial (Mackie 1970; 1983, I24) and there is no other independently datable material from the shore deposits.

One other occurrence of yellow beads which needs to be mentioned is the necklace found in the burial at 'Loughey', Antrim. This had numerous opaque yellow beads, which Guido stated were of her Class 8, and was dated to the mid 1st century AD (Jope & Wilson 1957, 74). However, Henderson has recently shown that these beads are not annular and have a chemical composition suggesting a manufacture in Ireland (Henderson 1987). The dating of these beads is not therefore relevant to the Scottish examples.

In summary then Guido's class 8 beads in Scotland often appear to be stratigraphically associated with Roman artefacts of later 1st- or 2nd-century date. It could be argued that these Roman finds were stray objects deposited at a much later date than their manufacture, but the number of examples argues against this. It could also be claimed that the lack of securely datable objects of pre-Roman date has a distorting effect on the apparent date of the beads. Again the proportion and number of sites makes this unlikely. Of the nine Hebridean sites with Class 8 beads, six have Roman period finds, and of the other 10 Scottish sites four have Roman period finds, two are multiperiod sites with Roman finds but with the beads unstratified (Castle Hill, Dalry; Lochspouts crannog); three others are either stray

finds (Culbin Sands, Fetlar, Glenluce Sands) or poorly stratified (Freswick, Arnieland crannog). In total then, of the 19 sites with Class 8 beads only five have not produced Roman material. Given the small numbers of Roman objects from native sites in Scotland, particularly in the Hebrides, it is difficult to argue that there is not a close association between the Roman finds and the Class 8 beads. Thus while it is possible that Class 8 beads in Scotland were available in the pre-Roman period, the balance of evidence suggests a date of later 1st- or 2nd-century AD.

This date is independently supported by Julian Henderson's scientific analysis of the composition of Iron Age beads which shows a change in the composition of beads in the 1st or 2nd centuries AD. The Scottish examples of Class 8 have a composition which accords with others made at or after this date (Henderson 1988; see also fiche 3:D8).

Egyptian Blue

The only other exotic find from the site is 5II, a piece of Egyptian blue from Phase A2. This pigment has a long history in the Mediterranean being in use as a raw material and colourant from at least 2500BC to the Roman period (Bick and Bayley 1979, 7-8). The Sollas piece has rubbed-down faces, suggested that it was being used as a pigment. Although manufactured in the Mediterranean, the Sollas frit was presumably an indirect importation from Roman Britain. Several pieces are known from Roman contexts (*ibid*; Needham & Bimson 1988) but this is the only example from a Scottish site of any date. It is undoubtedly an unusual and exotic import illustrating that the site was of some importance and by no means isolated from contact with the Roman world (*cf* the continental terracotta object from Dun an Iardhard (Curle 1932, 289-290). It would seem that this piece cannot be dated before the Roman invasion of Britain in the mid 1st century AD, if not before the invasion of Scotland later in the century.

2. Indigenous artefacts

The other finds from the site are all of local origin and can be paralleled on other Hebridean wheelhouse sites.

Iron objects

There are only four pieces of iron apart from the ring, a lack of iron objects being the norm on Iron Age sites in the Hebrides. The twisting of 504 is characteristic of Roman iron work though it is found in late Iron Age examples (Manning 1985) but no parallels can be suggested for this object. Despite the paucity of iron fragments, it is clear that iron tools were in common use on the site, as the examination of the tool-marks on the worked bone makes clear (fiche 3:B7-B8). Iron knives, axes, drills and saws can be shown to have been used on the site.

Projecting ring-headed pin

The pin which would be cast from mould 498 belongs to a group of pins almost entirely restricted to Scotland (Clarke 1971, fig 4) and widespread in the Hebrides. These pins were commonly used to stamp pottery, though only a few dubious examples of this technique came from Sollas. The origin and date of these pins has been the subject of much debate (Stevenson 1955; MacKie 1969; 1974, 71). This controversy has led Topping (1987, 71) to believe that these pins are not chronologically useful. Despite this debate no detailed typological study of these pins has been undertaken. MacKie (1974, 128-129) has shown that there is a variety of forms amongst the group: the pins can be of bent wire or cast; have small or large rings; be made of iron or bronze; and have the rings at a variety of angles to the shaft. A full study of these differences needs to be undertaken, particularly as most of the pins are very poorly illustrated. Both MacKie and Stevenson agree that cast examples, as at Sollas, are late in the series, and MacKie claims that all other pins and pin-stamped sherds from brochs and wheelhouses are of the earlier bent wire type (MacKie 1974, 129). However cast examples occur in the early levels at Traprain Law of late 1st- or 2nd-century date (Burley 1956, 168). The sub-rectangular shaped shaft, very large ring and tilted head clearly differentiate the Sollas pin from the bent wire pin at Dun Mor Vaul (MacKie 1974, fig 14, 202) and other Hebridean sites (Lethbridge 1952, fig 5) but show a clear relationship to the

Traprain pins (Stevenson 1955, fig 8, 2). A tentative date of 1st of second century AD can therefore be suggested for the Sollas mould. Unfortunately it is from midden deposits not directly associated with the wheelhouse. These deposits in Square 35 possibly pre-date the wheelhouse as no everted rim pottery was found in this trench.

Metalworking evidence

The evidence for iron working on the site is meagre as most of the slag reported in the finds register appears to be missing. Two pieces of slag and one piece of vitrified stone came from the Period B midden and may indicate iron working in the area around Wheelhouse B. Fine metalworking is shown by the complete crucible 497 and the mould 498. The crucible is a 'triangular' Iron Age type which persisted through into the Post-Roman period. The deep pyramidal shape is typical of Scottish examples and is unlike the shallower Iron Age crucibles of England (Lane 1987, 55). The pouring spout is unusual,but otherwise the shape can be paralleled at Dun Mor Vaul (MacKie 1974, fig 19, 495) in 2nd to 3rd century AD contexts; at A' Cheardach Mhor Phase 3 (Young & Richardson 1960, fig 13, 46), which Lane dates to the Dark Age (*ibid*); and recently at Loch Olabhat (Armit 1986, fig 4h) with a radiocarbon date of 2nd to 3rd century AD (Armit *pers comm*). XRF analysis indicates that the crucible had been used for copper alloy melting. The restriction of vitrification to the rim and interior suggest that it was heated from above unlike most Scottish crucibles (Lane 1987, 55). The mould fragment 498 shows that decorative jewellery was being produced on the site though unfortunately the exact stratigraphic relationship of the mould to the wheelhouse is not clear. The typology and date of the pin are discussed above. Mould fragments are found on several wheelhouse sites such as Tigh Talamhanta, Barra (Young 1953, 100) and Bac Mhic Connain (Beveridge & Callander 1932, fig 17), though the latter site has occupation lasting until the Dark ages and the moulds could be of that date (Lane 1983, 269). It is of some interest that 498 is a two-piece mould, as this represents a technological advance from the one piece investment mould of the lost wax method. The introduction (or properly re-introduction) of two-piece moulds is generally considered to be due to Roman influence in northern Europe. The moulds from Dun Mor Vaul are also two-piece moulds, though MacKie argues, unconvincingly, that despite this the lost wax method was used (MacKie 1974, 152-3).

Ceramic objects

These objects are all cut from sherds. The two discs (103, 153) may be incomplete whorls or counters.

Stone objects

Three of the stone objects (485-487) are made of lithified shell sand, a local resource whose use on the site is confirmed by the unused slab of the same material (515). The perforated and decorated square plaque 487 is unparalleled. The hammerstones, polishers, pot-lids and discs are all of types widely found on Hebridean sites. The rotary quern 496 is of interest, both from a chronological viewpoint and because of its peculiar reuse in a ?libation ritual. The presence of the rotary quern fragment 514 in Period BI shows that the Wheelhouse was constructed after the local quern replacement horizon, whatever date that turns out to be (Lane 1987, 57). The only other stone objects of interest are the collection of crushed quartz fragments, 527, found with the crucible (see Ritual Pits). Out of a number of pieces of pumice, only one, 508, shows signs of use as an abrasive.

ANALYSIS OF GLASS BEAD AND BLUE PIGMENT

by **Julian Henderson**, Research Laboratory for Archaeology and the History of Art, Oxford University, 6 Keble Road, Oxford, OX1 3QJ.

Opaque yellow annular bead 513

The chemical analysis by electron-probe microanalysis of a micro-sample of the opaque yellow glass bead (Table 16) places it firmly in the tradition of the 1st-2nd century AD Roman Iron Age of Scotland. Although annular opaque yellow beads are found in southern England during the 5th-2nd century BC period, and some have similar dimensions to the one from Sollas, their chemical composition is quite distinct from the visually indistinguishable Scottish ones. From amongst the large number of analyses of Meare opaque yellow glass that has been carried out (see Henderson 1989 and references therein) not a single example of a composition which is comparable to the Sollas bead can be found. The main differences are a relatively high manganese oxide (MnO) content, a relatively low lead oxide (PbO) content and a minor level of tin oxide (SnO_2) in the later, Scottish, glass. These compositional features are reliable indicators of the technological tradition used for the manufacture of the Sollas bead. It is only possible to point to these differences because a large data base of chemical analyses of Iron Age opaque yellow glass from Continental Europe, Scotland and England exists.

The blue pigment 511

The speckled blue pigment is a crystalline material which contains no observable glass phase. Electron microprobe analysis showed that it was a mixture of unreacted silica crystals and copper oxide, silica and calcium oxide. The composition of the material is given in Table 16, and the relative levels of the oxides are typical of *Egyptian Blue* ($CuCaSiO_4$).

The earliest recorded occurrence of Egyptian blue in Britain has recently been put back to the Late Bronze Age (Needham & Bimson 1988), so it is possible that it was also used in the Iron Age though at the moment apparently there is no published evidence for this. In Britain Egyptian blue was in predominant use as a blue pigment during the Roman period for wall paintings (Biek 1982). On balance, it is probable that this sample of Egyptian blue dates to the Roman Iron Age period of Scotland in the 1st-2nd centuries AD.

TABLE 16 Electronprobe microanalysis of opaque yellow glass bead and Egyptian blue (expressed as weight % element oxide).

	Opaque yellow glass bead	Egyptian blue
Na_2O	9.6	0.6
MgO	0.4	0.1
Al_2O_3	1.8	0.3
SiO_2	62.1	61.5
P_2O_5	0.1	0.1
SO_3	0.4	0.1
Cl	1.0	0.1
K_2O	0.5	0.1
CaO	4.6	14.2
TiO_2	0.1	ND
Cr_2O_3	ND	ND
MnO	0.4	ND
Fe_2O_3	1.2	0.1
CoO	ND	ND
NiO	ND	ND
CuO	ND	18.2
ZnO	ND	ND
As_2O_3	ND	ND
SnO_2	0.1	0.2
Sb_2O_5	1.4	ND
PbO	15.4	ND

ND = not detected

ANIMAL BONE

by **Dr Judith Finlay**

The total faunal assemblage from the site can be divided into 'domestic' material, contained in the floor deposits of Site A and Wheelhouse B and in midden samples, and 'ritual' material from the series of over 150 pits in the lower level in Wheelhouse B. These pits are of varying sizes and contain whole carcases, articulated joints and, in several instances, cremated bones deposited in pottery vessels; these deposits are taken to be of a ritual character, although some of the pits contain apparently 'domestic' fragments with or instead of the 'ritual' material (see ritual pits).

In dealing with the faunal material itself it has been decided that the bones from Site A should be treated as a unit. Two floor levels are distinguishable but the vast majority of the bone is from undifferentiated contexts and it seems more sensible to amalgamate it all given the small sample involved. All the bone from Site A belongs to some phase of occupation of the structure and there is no evidence to suggest that any of it was dumped from elsewhere after occupation had ceased. In wheelhouse B due to the resources available during excavation it was possible only to sample the midden deposits; since the samples come from widely separated areas within the midden it is not possible to relate the sequence in one area with that in another. Hence the midden material from Site B will also be treated as a unit and considered as a random sample. In wheelhouse B a distinction is made between the upper 'floor' levels (B2) and the underlying pit horizon (B1); the contents of each pit have been considered separately. There is a small amount of faunal material which can be assigned to the backfill of Wheelhouse B and this is treated as a separate unit (B u.s.). The Site A, wheelhouse B and wheelhouse B midden assemblages have been considered separately for the purposes of identification and quantifying, but have been grouped for measurements, determination of breed and evidence for butchery practice, as it was felt that such amalgamation of the deposits was acceptable,

since preliminary investigation showed no significant variation between the deposits in these respects.

It should be noted that the sample of bones recovered from the site is representative in the gross sense, in that it includes all the bones or bone fragments visible to the excavators, and that, except in a very few cases, no sieving was carried out. In the following discussion of the material, the 'ritual' pit material from wheelhouse B will be discussed separately from the 'domestic remains' of Site A and wheelhouse B, before the site is considered as a whole.

Estimates of the number of animals represented by the bones are based on MNI (minimum number of individuals) calculations made by counting the most frequently represented anatomical element, taking into account the factors of age, size and left/right.

It must be remembered that the quantities of stock animals mentioned are minimum estimates only and are to be regarded more in a comparative sense than as actual numbers of specimens represented. It is well accepted that the real number of animals originally present at a site is probably well in excess of the MNI estimates calculated. The faunal remains from the Wheelhouse B 'pit' level cannot be treated in this way due to the large number of complete skeletons recovered. These appear to have been deliberately disposed of and cannot be classed with the rest of the deposits. Complete carcases also distort the methods of analysis used on more widely varied and fragmented remains.

The problem with all methods of quantifying faunal material from archaeological sites is that we cannot determine the relative importance of the many factors affecting its survival. only a fraction of the bone originally deposited at a site will survive, and this will be biased according to the species and bone element concerned. Smaller and more porous fragments of bird, fish and small mammal bones, and the unfused bones of young animals of any species are more vulnerable. Fortunately the calcareous machair soil at Sollas seems to preserve

bone to a very high degree which considerably reduces the problem. It must also be accepted that the amount of bone fragments originally deposited on any archaeological site need not accurately reflect the original number of animals involved in the economy of the site, since stock could have been killed and butchered elsewhere.

Measurements of the bone were taken where possible, following the standardized scheme of von den Driesch (1976) and care was taken to measure only bones of mature animals which showed no signs of erosion at the points of measurement; burnt and chewed bones along with those showing any abnormalties were not measured.

Estimation of the age of animals at death were made using three standard and complimentary methods: the study of epiphyseal fusion (Silver 1969; Bull & Payne 1982; Bullock & Rackam 1982); the sequence of tooth eruption and replacement (Silver 1969; Andrews 1982); and the degree of tooth wear (Grant 1978; 1982). Tooth wear analysis was considered using the schemes proposed by Payne (1973) and Grant (1975) but the results only served to augment tooth eruption data and could not be analysed independently, owing to the small number of mandibles available.

Site A

The faunal material from Site A is lacking in individual contexts and must be considered as a unit. It comprises much ovi-caprid and cattle bone (Tables 22 & 23): 85 teeth and 374 bone fragments representing at least 2 neo-natal and 14 older sheep; 109 teeth and 158 fragments from at least 2 neo-natal and 4 older cattle; a lesser amount of pig (23 teeth and 20 fragments), probably from a single animal; and deer (1 tooth and 5 fragments) Since the only ovi-caprid horn-cores found were sheep, it is assumed that no goat was present at the site.

Sheep bones were found in sufficient quantity and in a suitable state of preservation to enable measurements to be made. These point to a small, slender-

limbed breed of 9-13kg, similar to that which appears to be represented at other sites in the Uists (Clarke 1960; *pers comm*) and which compare closely with the bones of the 'primitive' Mouflon type surviving today in the Shetland breed. They are slimmer and shorter than the Soay breed (Anon 1979; Jewell 1980).

The results of both epiphyseal fusion study (Table 17) and tooth eruption analysis (Table 18) from Site A suggest that some of the sheep population were mature beasts surviving to over 3 years old; presumably indicating use as breeding stock, and giving a supply of dairy products and wool. A further concentration of sheep bones and jaws from animals between 6 and 30 months old suggest a flourishing flock with animals surplus to breeding/textile requirements being culled at around 2 years of age, at the point of optimum return (in meat) for input (feeding).

The general small size of the cattle bones from Site A suggests that they were small, delicately boned animals of much the same build as the West Highland or 'black' cattle, the traditional breed in the Western Highlands and Islands. Unfortunately the sample of cattle bone was too small for any definite pattern or husbandry to be perceived. At least one animal certainly survived to over 42-48 months but the number of fragments recorded and the MNI estimations made are so small that any attempt at further analysis would only be misleading. It can only be suggested that a cow was kept for milk and other dairy products and occasionally brought to calf, either to raise as meat or for trade, or to replace the cow when she was past her prime. A massively robust scapula may represent a bull kept for breeding.

Horse is represented by only two bones, and no indication of size can be gained.

The pig canine tooth recovered from the site did not show the 'beading' characteristic of wild boar, and the few pig remains recovered are assumed to be

domestic. Pig remains are even more sparse than those of cattle and it can only be assumed that one or two pigs were maintained and occasionally bred as a source of meat and raw materials. Tooth eruption data (Table 18) seems to support this view. Since the Uists provide little natural forage for pigs they would have to be provided with all their feed and this may account for their apparent unpopularity as stock animals at Sollas.

Useful in this context is a reminder of the tradition, still current in parts of Ireland today, of keeping a couple of pigs (often in the kitchen) whose offspring were eaten or sold, and who were themselves eaten when their breeding life was over.

Dogs are represented by only 3 teeth, one of them a canine from a fairly large dog, and by 2 metatarsal fragments from a medium-sized dog, of roughly comparable size to a modern sheepdog. The larger dog may have been a hunting dog, particularly suitable for the hunting of deer, while the medium-sized type may indeed have been used as a sheepdog to aid flock management in the movement between grazing areas. From the area as a whole we have a suggestion that several breeds or types of domesticated dogs were in evidence in prehistory, whether as an accident of natural selection or, as seems more likely, through the intervention of man and his attempts to produce animals to aid his specific activities. There is no evidence from any wheelhouse for the use of dogs as meat and it is presumed that they were accorded a special status among the fauna at the sites (Finlay 1984).

Red Deer is apparently the only wild land animal present and is evidenced by a few bones and a considerable quantity of worked and unworked antler. Two bases of antler were cast and none was certainly cut from the dead animal. Given the low amount of deer bones on the site it is likely that almost all the antler utilised on the site was collected as shed antlers.

Cetacean bone occurs as both worked and unworked fragments. This would have been an extremely valuable resource in an unwooded landscape where quality

driftwood was insufficient in quantity for all the demands made upon it: whale bone would serve just as well as wood in most cases. The whale provides other raw materials too as flesh and blubber are important sources of feed and light. Skins can be used as leather for clothing or boats, and bones have a multitude of uses from constructional components to vessels and implements. Bones can also be used as fuel, as in the Faroes at the turn of the present century where fresh whale bones were burnt instead of peat (Amandale 1905). It is possible that stranded whales could have been the source of this material but we cannot rule out the possibility of deliberate hunting of whales from small boats as happened in the more recent past.

A single tooth and one bone are the only evidence of seal identified from the site and both are from Grey Seal. Both Grey and Common Seal are common around the outer Hebrides and represent a potential source of meat, oil and sealskin. Both species have been recovered from other wheelhouse sites in the Uists.

Only a few bird bones have been recovered from Site A, all sea-birds. The sample is too small to do other than note the species represented, including the now-extinct Great Auk (Table 19).

Fish bone is poorly represented at Sollas (Table 21) as at other Wheelhouse sites in the outer Hebrides, with the marked exception of Udal where the material was sieved: the imbalance is therefore taken to be one of recovery rather than economy. The Site A sample is exclusively from the Cod family - these are by far the most frequently occurring species at wheelhouse sites. Fish represent a rich resource of food, oil and fertilizer.

Throughout the site rodent and lagomorph bones are considered to be intrusive and will not be discussed, while the few pieces of human skull from Site A are insufficient for comment.

Wheelhouse B midden

From the midden were recovered 'little meals', that is, small heaps of shells, interpreted by the excavator as the remains of individual repasts: unfortunately, information regarding the species contained within those deposits is no longer available but it seems reasonable to suggest that the species most commonly found today, and at other archaeological sites in the area, would also be favoured here.

The species represented by the bones recovered from the wheelhouse B midden samples are: sheep, 3 teeth and 98 bone fragments from 1 neo-natal and 7 older animals; cattle, 62 teeth and 139 fragments from 1 neo-natal and 2 older animals; pig, 4 teeth and 14 fragments from a single pig; deer, 4 fragments and several pieces of antler; and a single horse bone which appears rather fresh and may be modern.

The same patterns as those seen for the Site A material can be seen on a smaller scale in the sheep and cattle remains from the midden sample and are interpreted as further evidence of the same husbandry strategy. A few bones of bird and fish were also recovered (Tables 20 & 21) and some fragments of whale bone. These latter were no doubt connected with the whalebone working area in trench EE.

Wheelhouse B - 'pit' horizon (B1)

The earlier 'pit' horizon (Period B1) of Wheelhouse B showed some variations between the central area and the 13 cells surrounding it. The faunal assemblage from the cells around the central floor shows a large quantity of apparently 'domestic' refuse plus some burials of complete animals or articulated joints, alone in a pit or with other bone fragments. The most notable contents of the cells will be briefly noted.

Cell 4 1 pit containing much burnt cattle bone which could all have come from the same 3 year old animal.

Cell 5 Three of the pits held only scraps but Pit 2 contained a quantity of sheep bone, some of it burnt; a complete bovine aged about 12-24 months; and other scraps. Pit 4 held a single sheep aged less than 13-16 months.

Cell 7 Pit 1 held the articulated 'ankle' joint of a sheep and some scraps. Pit 2 contained a fair quantity of scraps of the main food animals and unidentifiable material, both burnt and unburnt. The burnt remains of a 42 month old bovine filled Pit 3, Pit 13 held the unburnt bones of a calf of less than 12-18 months and a few other scraps. Pit 7 contained another bovine under 12-18 months, a lamb of 6-16 months and a few scraps. Floor 2 itself produced remains of a sheep between 6-16 months old and other scraps including a bird bone.

Cell 8 Material was sparse and unremarkable (sheep, cattle, pig and Cod *Gadus morhua*), with the exception of Pit 5 which held quite a lot of burnt cattle bone, apparently a single animal, among other fragments.

Cell 9 Bone is available from fourteen of the pits: Pit 1 contained a sheep of 24-30 months; Pit 2 a burnt piglet under one year old; Pit 3 a calf under 12-18 months old; Pit 5 a lamb of about 10-18 months old; Pit 9 a sheep of over 36-40 months and a lamb under 10 months old; Pit 10 an articulated forelimb of a sheep; Pit 12 a sheep over 36-42 months old and a lamb of around 12 months old, among other fragments; Pit 14 a calf of less than 7-18 months; and Pit 19 a lamb of about 10-18 months old. Pit 16 held the burnt remains of at least seven lambs ranging from under 10 months to 13-16 months. Pit 8 contained burnt sheep in the basal part of a pot. The other contexts contained only scraps of the main animals and unidentified fragments.

Cell 10 Pit 3 contained a sheep 18-30 months old, and Pit 1 produced neo-natal lamb bones. The remaining pit held only unidentifiable fragments.

Cell 12 Contained very little material, identifiable or otherwise, including some neo-natal cattle bones from below the floor.

Cell 14 Floors produced only scraps of the main animals and a whale bone fragment. Pits 1 and 3 held sheep, cattle and pig; and Pit 2 contained the remains of a sheep about 47 months old.

The central area contained very large quantities of burnt bone over the floor and in the pits. For ease of reference the pits will continue to be dealt with by quadrants as they were excavated.

NE Quadrant: Bone remains are available from sixteen pits, four of which contained only scraps. Pit 1 contained two sheep of around 24-30 months old, and fragements of burnt cattle bone. A large amount of burnt bone in Pit 2 include a neo-natal calf, a calf less than 12-18 months old, a slightly older animal of 12-30 months of age, a few sheep and pig fragments and much unidentifiable material. Pit 4 held a lot of bone including two sheep aged 13-20 months, fragments of a neo-natal calf, burnt fragments of at least two adult cattle, a single pig bone and much burnt and unburnt material. In Pit 6 were two sheep, one between 18 and 30 months old, the other less than 18 months. Pit 8 held two neo-natal calves, and two sheep, aged about 18 months and over 42 months respectively. Pit 10 contained a lamb about 10 months old, two sheep aged over 36-48 months, another 10-18 months, and fragments of two calves under 18 months. Pit 11 had the remains of two calves aged 12-18 months. A single sheep aged between 18 and 30 months old was recovered from Pit 13, a lamb of about 10 months from Pit 14, and one of between 10 and 24 months in Pit 15. Much burnt bone in Pit 22 included a few fragments of sheep and deer and at least three cattle over 18 months old, at least one of which was over 42-48 months old. In Pit 24 were the remains of two lambs under 13-16 months old. Pit 7 held an urn containing the burnt remains of a bovid over 42-48 months old, a clear sign of deliberate burial.

SW Quadrant: Bone material is available from 12 pits of which four contained only fragments. Pit 1 included foot bones apparently from a single sheep, and in Pit 4 a large quantity of burnt bone produced only a few scraps which could be identified. Pits 3, 12 and 20 each contained single sheep, aged over 36-48 months, over 36-42 months and between 10 and 18 months respectively. In Pit 5 a very large quantity of burnt bone included a bovine over 42-48 months old, fragments of sheep, pig and deer and the unburnt bones of a piglet under a year old. Pit 14 had the burnt remains of at least two cattle, one over 36-42 months, one under 24-30 months, while Pit 16 contained at least three sheep, two over 36-48 months, the other between 10 and 18 months.

NW Quadrant: This produced bone from 14 pits, of which five contained only scraps. Pit 1 included a foetal lamb among fragments of sheep and pig, burnt and unburnt. Pit 2 included a foetal lamb, a calf under 18 months and two burnt pigs of 12-24 months old. Pits 5 and 8 each contained a burnt piglet under 12 months old. In Pit 11 was a foetal lamb, in Pit 21 a foetal lamb and a sheep over 36-48 months old, and in Pit 22 a foetal lamb. In pit 10 a burnt sheep was aged over 36-42 months and in Pits 14, 15 and 16 were a foetal lamb, a burnt lamb aged under 13-16 months, a burnt sheep over 30 months, a neo-natal calf, a calf under 18 months, a burnt bovid over 42-48 months and some burnt pig fragments. Pit 17 produced much burnt cattle bone.

Wheelhouse B - floor levels (B1)

The upper floor levels of Wheelhouse B (Period B2) contained very little bone indeed, generally very fragmented and of varying species. In Cell 6 a single animal under 24 months old may be represented by cattle bone, and some sheep neo-natal fragments were recovered from the other debris. More neo-natal fragments

of both sheep and cattle came from Cell I0. In the central area were found a single sheep around 3 years old (complete except for the metapodials) and 2 neo-natal calves, among a small amount of mixed species fragments (Table 25).

Wheelhouse B unstratified

From the wheelhouse B 'backfill' came only fragments of a single sheep (I tooth and I2 fragments), 1 neo-natal and 2 older cattle (9 teeth and 20 fragments), pig (1 tooth and 1 fragment) deer (1 fragment and some antler), and horse (1 tooth and bone). There is too little material from this context to allow further comment.

Discussion

The faunal material from the floors of wheelhouse B, from Site A and the wheelhouse B midden samples does not suggest other than purely 'domestic' refuse which could be accidentally included in the floors of dwellings or dumped on the midden outside, but the pits of wheelhouse B present a rather different case. Since we are unable to determine exactly why the users of the building chose to bury complete or partial animal carcases, as well as miscellaneous fragments of bone, in pits inside the buildings, we tend merely to classify such behaviour as 'ritual' and treat it as totally distinct from any secular activities evidenced at the site. However, it is vital that we should not impose our own cultural dictates upon the remains from the site since a glance at many societies, past and present, shows that 'ritual' and everyday living can be inextricably bound together to an extent which our own society finds difficult to comprehend. Thus although the faunal material from Sollas has been tentatively divided into 'domestic' and 'ritual', depending on its context, we must accept that a fair amount of 'domestic' scraps seem to have found their way into the pits, and we cannot tell whether the animals in the 'ritual' pit burials were specifically killed for the purpose, or whether a natural loss was used for ritual purposes when available - a most economic method of propitiation! Certainly the majority of the sheep from the pits were

mainly under 18 months or over 42-48 months, plus seven neo-natal calves (Table 24). Pig was surprisingly little represented but in all five of the burials which included pig the animals were under 24 months old, under 12 months in four cases. Both burnt and unburnt carcases were recovered, with most sheep being unburnt, cattle fairly evenly spread between both, and four of the five pigs cremated (see ritual pits). Animals were found singly, with others of the same species, with other species or with apparently miscellaneous refuse. Burnt and unburnt bone was often mixed in the same pit and some pits contained only fragments of bone, often unidentifiable. Some of the animal burials appear to be lacking heads and/or feet, but it is impossible to say whether this was because the extremities served some practical function (the head for food, the metapodials for tool making) or for a deeper 'ritual' reason.

Rather more information can be sought from the 'domestic' assemblage from the site. As previously noted sheep appear to be the main food resource, with a lesser amount of cattle, pig, horse and dogs as the domesticated animals and red deer, seal, bird and fish as the wild resources (Table 22).

The evidence for the practice of butchery is obviously of prime importance in any consideration of the economy of the inhabitants, as reflecting social, religious or dietary preferences.

For the purpose of analysing the various elements of butchery practice on the Sollas material a distinction was drawn between 'stripping marks' which are taken to represent the removal of skin from the legs, meat from the bones or the cutting of tendons, to aid disarticulation, and 'chopping marks' which are seen as the cutting through the bones to separate elements or to divide larger elements into smaller units. It must be noted that the small size of the sample limits us to a general idea of the butchery process at the site, although the correspondence of the results with the evidence from other ungulate studies suggest that this may

represent the logical and efficient way of processing the carcase. on those points of details for which we have no direct evidence from Sollas, we can extrapolate from ethnographic parallels the probable situation at the site. The individual butchery cuts on the Sollas material are considered below, and in diagrammatic form in illus 73 & 74.

The evidence for the butchery of sheep at Sollas is as follows (cut mark numbers referred to below relate to the numbers on illus 73). Skinning of the animals is apparently represented by 'stripping' marks at the metapodial/phalangeal joints (Cut 1); or on the dorsal, lateral and medial surfaces of the astragalus and calcaneum (Cut 2); this process is not shown by cut marks on the carpal bones but this is not notable since the cartilage and ligaments can be easily severed at this point without leaving any trace on the bones. The disarticulation of the foreleg is achieved by separating the distal scapula from the proximal humerus, either by severing the heads of the muscles (triceps brachii) with a knife and then disarticulating the humerus head from the glenoid cavity of the scapula (Cut 3), or by chopping the joint apart with a heavy blade (Cut 4). The distal humerus/proximal radius/ulna were disarticulated at the 'elbow' (Cut 5). The hind leg was disarticulated by the pelvis being chopped through near to the acetabulum, sometimes also catching the head of the femur (Cut 13). No cut marks were noted in the acetabulum, but a few knife marks on the femoris caput (Cut 6) may indicate disarticulation of the femur from the innominate bone, although it is difficult to sever the muscles (ligamentum teres) without scoring the wall of the acetabulum. Knife marks on the pelvis, radius, femur and tibia shafts are probably associated with defleshing rather than dismembering the carcase. Ethnographic parallels (Gulliday *et al* 1962) suggest that the hind-quarter from hip to hook could be processed as a unit in small ruminants, which supports the lack of evidence of disarticulation of the knee joint in the Sollas material. However, chop marks occur through the lower part of the shaft of the femur (Cut 7), through the shaft of the tibia (Cut 8) and, on the fore-leg, the shaft of the radius (Cut 9) and the

metapodials (Cut 10). These are well represented and, at first, presented a considerable problem since sheep limb bones are small enough to be processed as individual units; thus, a radius severed at Cut 2 and at Cut 5 does not require to be chopped in half (Cut 9), an action which reduces each portion to a matter of a few inches in length. In the absence of any other evidence to the contrary, it is suggested that this mid-shaft fracture was made for the extraction of marrow, after disarticulation, and possibly also after cooking.

Most vertebrae identified from the site showed evidence of having been cut down the length of the spinal column and had been cut through their transverse processes: ribs often showed signs of having been cut through below the head, with either an axe or a sharp knife. Cranium fragments of sheep were so few that it is not possible to determine whether or not the skulls were chopped into, in order to reach the brains. An atlas has a transverse chop across the cranial and (Cut 11), suggesting that the carcase had been decapitated by an axe blow between skull and atlas, but there is no additional evidence to support or destroy this impression, except that a mandible had apparently been separated from the cranium by cutting through the ascending ramus of the mandible, presumably by hacking downwards and outwards from the open jaw (Cut 12).

Thus it can be reasoned that the stages of preparation and butchery evidenced upon the sheep bones were (not necessarily in this order):

1. animal skinned and detached at metapodial/phalangeal joint, or possibly at carpals/tarsals,
2. pelvis split and each hind-quarter detached from spinal column; disarticulation at hock,
3. fore-limb dismembered at 'shoulder', 'elbow' and probably 'wrist' joints,
4. at this point the viscera could be removed and the thoracic cavity cut up into loin, rib cage and head, ready for further processing and cooking.

The same butchery marks are found on many of the pit burials as well as on the patently domestic material. Commonly found marks on the atlas suggest removal of the head but such marks are also found on at least two complete sheep skeletons found in the pits. Perhaps they were caused by skinning or defleshing the carcase instead. Marks of knives are regularly found on astragalus and calcarous bones and are taken to be the result of cutting through the tendons to deflesh or to detach feet. Some of the sheep carcases in particular have no metapodials or phalanges present which suggests that they were removed for some purpose before the carcase was buried. This may have been for tool-making as the strong shaft wall and decorative distal epiphyses of metapodials make them very suitable raw material.

The evidence for the butchery of cattle from Sollas shows basically the same features as for sheep, although the evidence is more scanty and the joints are necessarily cut into more fragments, due to their large size (illus 74). There is clear evidence of skinning at the mid-metapodial, where the cutting marks across the back of the bones 'skip' over the channels for the tendons, indicating that this took pace while the tendons were still *in situ* (Cut 13). Marks on the phalangeal/metapodial joints and on the phalanges themselves may be an example of stripping taken to a lower point (Cut 1), but the chopping of a few phalanges may represent marrow extraction (Cut 14). The fore-limb is disarticulated at the scapula/humerus, either by cutting ligaments (Cut 3) or by chopping through the weakest point on the humerus shaft (Cut 5). Radii were too poorly represented to present any evidence for butchery, but disarticulation at the carpels is clearly represented (Cut 2). Metapodia are consistently chopped through, both horizontally and vertically (Cut 12), presumably for marrow extraction, though it must be remembered that the metapodia are potentially the most suitable bones from which to make many bone tools and implements. The hind limb is separated from the vertebral column by cutting through the acetabulum and/or through the ilium (Cut 7 & Cut 8). Mid-shaft fracture of the femur (Cut 9) and of the tibia (Cut

11) are represented, although whether for marrow or to process into suitably sized joints it is impossible to say. Cuts around the 'knee' joint suggest some possible attempt at disarticulation, but may merely represent removal of meat from the bones (Cut 10).

The evidence for butchery patterns regarding the other species represented at Sollas is too scanty to allow consideration.

Fragmentation analysis was also conducted on the bones but the small numbers of fragments made results invalid for all species except sheep. Table 26 shows that the percentage of unbroken sheep bones from the identified assemblage varies between 27% and 44% and is roughly compatible with the results obtained from analysis of material from Udal (Finlay 1984). It must be remembered that in fragmentation analysis there is a high chance of bone being included in the count which has been broken accidentally after inclusion in the deposits.

No pattern of charred bone, which might indicate cooking methods or meat preferences, can be recognized from Sollas. Likewise, there is no clear distinction as to whether certain bones have been charred in preference to others, although marks made by the teeth of canine animals have been noted on bones from the site.

Taking all the above results into consideration we can then conceive of the economic base of the wheelhouse complex at Sollas as an agricultural economy, based primarily on sheep and cattle (for meat, wool and dairy produce) with a lesser amount of pig. Drawing on modern and historic data, husbandry patterns can be proposed for each of these species which would seem to be the optimum economic solutions for the situation and which are not contradicted by the archaeological evidence.

The domestic animals, as represented by the bones appear to be almost disease-free (fiche 3:E11-E12), with a single example of arthritis (in the neck, not the feet as often found among animals from rocky terrain) and one of periodontal decay, which is regularly found in ruminants. Horse and dog were present at the site,

presumably in a utilitarian capacity. Red Deer are the main wild species at Sollas, with birds and marine resources (fish, seal, crustaceans and molluscs) available but not necessarily exploited. Whale bone was apparently a common raw material at the wheelhouse site, presumably derived from beached whales and may have been substituted for timber in building, as well as being utilized for smaller items.

Thus the overall picture is presented of a small community with an agricultural basis using their natural environment to augment their livestock resources.

Postscript: a fuller analysis of the faunal evidence in comparison to other Hebridean sites can be found in Finlay (1984) where all the raw data is also given.

APPENDIX. ABNORMALITIES IN THE BONE ASSEMBLAGE

by Dr W M Stokes and Dr S A Kempson, Anatomy Department, Royal (Dick) School of Veterinary Studies, Edinburgh, and Dr R Sprinz, Anatomy Department, Edinburgh University Medical School.

Sheep:
rib fragments with healed fracture site (WA/5);
maxilla fragment with slight evidence of periodontal decay (WA/5);
mandible with "pitting" of alveolus due to periodontal decay, also accessory mandibular foramen at P2 on buccal side (WA/2);
axis with necrosis of caudel epiphysis due to arthritis of the articular cartilage/Synovial joint. (WA/69);

Cattle:

humerus with abnormally deep olecranon fossa is merely an extreme example of individual variation within the species. (WA/75);

mandible with accessory mandibular foramen at p2 on lingual side. (WB 13/8);

astragulus with distal lesion, merely a variant on the synovial fossa, probably indicating domestication since it is generally caused by food change. (WB/ES/3);

canine tooth shows the typical lingual fossae and the fissure running apically across the cingulum, but there appears to be some malformation labially which in the normal tooth does not show the extensive shallow depression present on this specimen.

Horse:

rib with small, round lesion at tubercle, probably abscess, common in this position in horses.

TABLE 17 Sheep: epiphyseal fusion data (Silver 1969)

AGE in months	BONE & EPIPHYSIS	Site A		B midden	
		u.	f.	u.	f.
neo-natal	metapodial prox.	1	7	2	4
	% unfused	12.5%		33.3%	
10	humerus dist.	11	15	1	3
	radius prox.				
	% unfused	42.3%		25.0%	
13-16	1st phalange prox.	26	43	3	3
	2nd phalange prox.				
	% unfused	37.7%		50.0%	
18-24	metacarpal dist.	25	20	3	-
	tibia dist.				
	% unfused	55.6%		-	
20-28	metatarsal dist.	11	8	-	2
	% unfused	57.9%		-	
30-36	radius dist.	15	10	7	1
	ulna prox.				
	femur prox.				
	% unfused	60.0%		87.5%	
36-42	femur dist.	19	19	3	3
	tibia prox.				
	humerus prox.				
	% unfused	50.0%		50.0%	

u. unfused f. fused prox. proximal dist. distal

TABLE 18 Sheep: tooth eruption data (Silver 1969)

Age in months	Site A	B midden	B u.s.
<6	1 (2.4%)	-	-
6-18	1 (2.4%)	-	-
6-30	8 (19.0%)	2 (22.2%)	1 (100%)
18-30	7 (16.7%)	2 (22.2%)	-
>30	2 (4.8%)	1 (11.1%)	-
>40	23 (54.8%)	4 (44.4%)	-
TOTAL	42	9	1

TABLE 19 Pig: tooth eruption data (Silver 1969)

Age in months	Site A	B midden
12-24	3 (75%)	1 (100%)
24-36	-	-
>36	1 (25%)	-
TOTAL	4	1

TABLE 20 Bird species by fragment count

Species	Site A	Bmidden	B1	B2	Bu.s
Fulmaris glacialis Fulmar	-	3	1	-	-
Puffinus puffinus Manx Shearwater	-	-	-	1	-
Sula bassana Gannet	1	1	-	1	-
Anser sp Goose	-	-	-	1	-
cf *Lyrurus tetrix* Black Grouse	-	-	-	1	-
cf *Larus argentatus* medium gull	-	-	-	3	-
cf *Larus marinus* large gull	1	-	-	-	-
Alca torda Razorbill	-	-	-	1	-
Fratercula arctica Puffin	-	-	1	-	-
Alca ripperis Great Auk	2	-	3	2	-
Gavia stellata Red-throated Diver	1	-	-	-	-
Motacilla yarellii Pied Wagtail	-	-	-	5	-
Turdus pilaris Fieldfare	-	1	-	-	-
Passer domesticus Sparrow	-	-	-	1	-
Sturnus vulgaris Starling	-	-	-	1	-
Corvid sp. Crow family between Crow and Raven	-	-	-	-	1
Nid	3	1	1	9	1
TOTAL	8	6	6	26	2

TABLE 21 Fish species

Species	Site A	Bmidden	B1	B2	B u.s.
Cod	-	-	6	1	-
Saithe	-	-	1	9	-
Cod family	13	-	4	3	-
Nid.	-	1	3	3	-
TOTAL	13	1	14	16	0

TABLE 22 Main species by number of fragments

Species	Site A	B midden	B u.s.
Sheep	374 (67.0%) 85 teeth	98 (38.1%) 31 teeth	12 (34.3%) 1 tooth
Cattle	158 (28.3%) 109 teeth	139 (54.1%) 62 teeth	20 (57.1%) 9 teeth
Pig	20 (3.6%) 23 teeth	14 (5.4%) 4 teeth	1 (2.9%) 1 tooth
Red Deer	5 (0.9%) 1 tooth	4 (1.6%)	1 (2.9%)
Horse	1 (0.2%)	2 (0.8%)	1 (2.9%) 1 tooth
Dog	2 (0.4%) 3 teeth	-	-
Seal	2 (0.4%)	-	-
Whale	5	10	-
Bird (Table 20)	8	6	2
Fish (Table 21)	10	1	-
TOTAL	**585**	**264**	**37**

TABLE 23 Main species by Minimum Number of Individuals(MNI)

Species	Site A	B midden	B u.s.
Sheep	14 (66.7%)	7 (58.3%)	1 (16.7%)
Cattle	4 (19.0%)	2 (16.7%)	2 (33.3%)
Pig	1 (4.8%)	1 (8.3%)	1 (16.7%)
Red Deer	1 (4.8%)	1 (8.3%)	1 (16.7%)
Horse	1 (4.8%)	1 (8.3%)	1 (16.7%)
TOTAL	21	12	6

TABLE 24 Wheelhouse B articulated burials: estimated ages at death.

A. SHEEP

PERIOD	neonatal	<12 months	12-24 months	24-36 months	>36
B1	8	10	19	3	11
B2	2	-	-	-	1
TOTAL	10	10	19	3	12

B. CATTLE

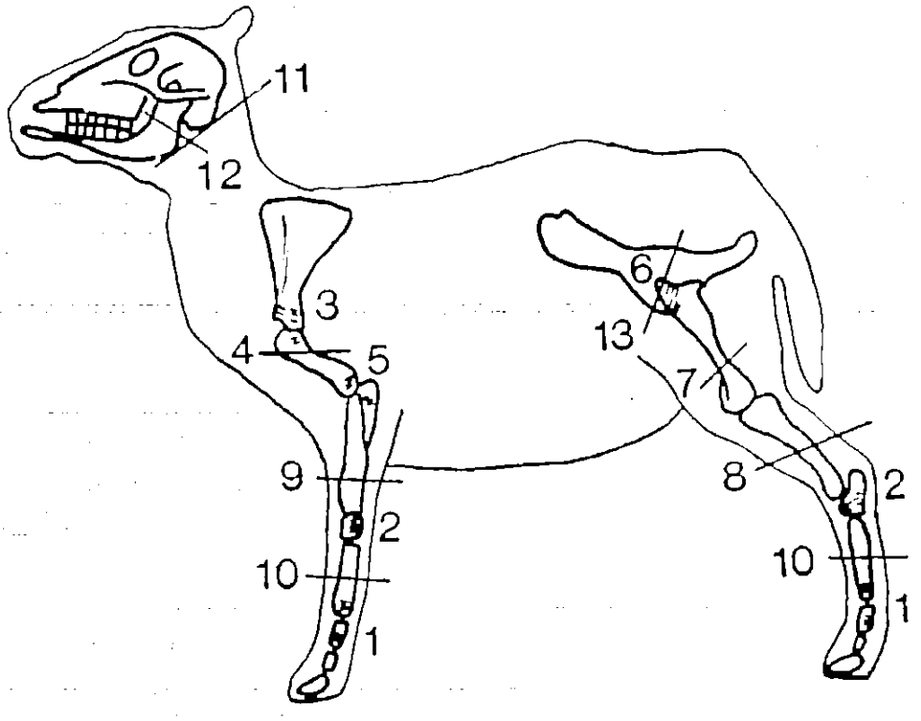
PERIOD	neonatal	<12 months	12-24 months	24-36 months	>36
B1	7	5	4	3	8
B2	3	-	1	-	-
TOTAL	10	5	5	3	8

TABLE 25 Incidence of neonatal animals (by MNI) in Wheelhouse B.

PERIOD	Sheep	Cattle	Pig
B1	8	7	-
B2	2	3	-
TOTAL	10	10	0

TABLE 26 *Sheep: fragmentation data for main meat-bearing bones (humerus, femur, tibia, radius) and for potentially most useful raw material bones (metapodia). Neonatal bones not included.*

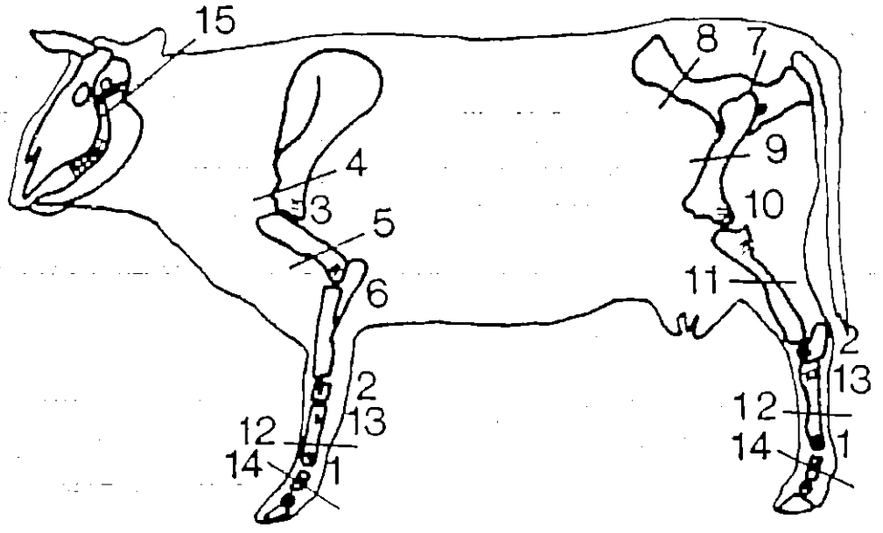
PERIOD	MEAT-BEARING BONES			RAW MATERIAL BONES		
	complete	frags.	% complete	complete	frags.	% complete
Site A	40	143	28.0%	31	58	53.4%
Bmidden	6	28	21.4%	1	11	9.1%
B u.s.	-	2	-	-	3	-
TOTAL	46	173	26.6%	32	72	44.4%



CHOPPING MARKS

STRIPPING MARKS

ILLUS 73 Butchery marks on sheep bones.



CHOPPING MARKS

STRIPPING MARKS

ILLUS 74 Butchery marks on cattle bones.