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A Cromwellian Warship wrecked off Duart Castle, Mull, Scotland, in 1653

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Chapter 5

THE SHIP: STRUCTURE AND LAYOUT

5.1 Basic hull-form

The Duart Point wreck is beyond full reconstruction as a complete ship. Most of the hull is no longer extant, and much of what remains has been displaced, randomly re-deposited, and juxtaposed within the natural environment in ways rarely definitively explicable in spatial or quantitative terms. Moreover, since the primary aim of the project has been to stabilise the site with minimal intrusion, much structural evidence which might have been revealed by a more robust excavation strategy remains uninvestigated. This is particularly so of those parts of the lower hull buried beneath the two ballast-mounds, and the collapsed side of the upper stern structure presumed to lie beneath the remains of the aft-cabin interior.

Despite these constraints, enough data from structural remains and artefact distributions are available to support a number of general and sometimes specific conclusions about the dimensions, proportions, structure, and internal layout of the ship. These cannot be stretched so far as to inform a full reconstruction of the vessel's shape and constructional details, or the use of space within the hull, but they do permit the creation of what may be termed a three-dimensional envelope within which aspects of these topics can be hypothesised at various levels of probability and detail. What follows should be read with reference to Chapters 3–4.

The aftermost section of the lower stern structure is substantially intact, with the bottom parts of the rudder, sternpost assembly and deadwood-knee surviving as an articulated complex. The evidence suggests a fine run to the hull, with crutched timbers raised above the deadwood, and chocks used to maintain a slim profile. The entire aft part of the hull, including an associated section of the keel, appears to have twisted to port and detached itself. Its upper timbers collapsed onto their sides where some are now stabilised in a way that retains elements of their former structural cohesion. The end of the lower stern assembly can thus be regarded as representing the aftermost point of the keel-axis and is therefore a convenient starting-point in the reconstructive process.

A projection forwards along this axis aligns closely with the well-preserved remains of the keel and keelson as they pass through the articulated midships section of the lower hull, eventually to emerge from beneath the front edge of the forward ballast-mound where they demonstrate the beginnings of the upwards curve into the stem. While recognising that the slight displacement of the aft structure caused by a longitudinal twisting moment near the stern, and the eroded condition of the forward ends of keel and keelson, may have caused some imprecision in defining the distance between the keel terminals, its length can with reasonable confidence be estimated as 18.25m (59ft 10½in). For comparison with contemporary sources this has been rounded to 60ft.

Sternposts of ships of this period typically had a rake of 20° from the vertical (Lavery 1988: 19). This matches the angle of the surviving stump of the Duart Point sternpost, and a continuation of the line is reflected, though at a greater angle (*c* 50° from the present lie of the keel), by the eastern edge of the interior stern deposit, which, as argued above, probably marks the position of the detached and partially displaced transom during the second phase of the ship's break-up sequence. An aft rake of 20° has therefore been adopted for the sternpost of the reconstructed hull, with the set of the transom angling closer to the vertical in the manner indicated by many contemporary sources. The sweep of the stem (the segment of a circle rising from the forward end of the keel) is less easy to define, but in his reconstruction of *Susan Constant* Lavery (1988: 10) suggests a circle, the radius of which is 0.791 of the hull breadth, rising tangentially from the keel, and this formula has been adopted to give a stem-sweep radius of 6.03m (19ft 8in) for the Duart Point hull. These three elements – keel-length, sternpost-angle, and stem-sweep – combine to give a basic longitudinal profile for the hull (Illus 131).

The two midships sections provide reliable profiles of the floor-timbers and lower bilges extending some 3m (10ft) to port of the keel-axis. From these sections, and by extending the sweep from the bilge to accommodate other available data on a best-fit basis, sections of the presumed Master-Frame ⊗

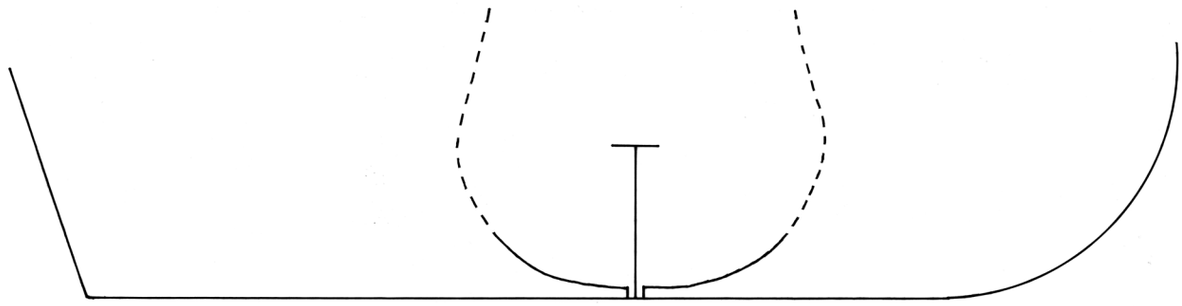

Illustration 131
Reconstructed longitudinal profile and master-frame cross-section

Illustration 132
Top: speculative framework of the hull based on recorded elements. Bottom: speculative half-model faired with modelling-compound

and Frame 3.6A (the mainmast position) can be reconstructed. This defines a maximum beam of 7.6m (25ft), giving a beam to keel-length ratio of 1:2.4.

Six of the rising port-side frames towards the stern run close to the articulated sternpost and associated structures, and, while now separated from it because of erosion at their lower ends, their spacing and right-angled set from the keel-axis suggest that they remain close to their original positions, though they have collapsed downwards and outwards. The longest, Frame 10.8A, extends 3.7m (12ft 1½in) from the keel-axis, bringing its upper end well above the presumed waterline. This, with allowance for distortion, dislocation, and the presumed upper-deck width at this part of the hull, provides a basis for reconstructing a section of the after hull 2.4m forward of the keel skeg. Fortuitously this position accords closely with the postulated location of the reconstructed panelled bulkhead which probably defined the forward end of the stern cabin on the upper deck, and these two elements can be combined to reconstruct a hypothetical profile at this point, up to and including the quarter-deck. The taper of the upper structure aft towards the flat transom is defined by the need to accommodate the reconstruction of the transom layout (see below).

The aft frames continue to show a right-angled set to the keel-axis, unlike the sternwards-angled cant-frames of later practice (cf Steffey 1994: 268, 294–5). The fragmentary remains of structure associated with the forward end of the keel likewise indicate non-canted framing, while the configuration of the forward ballast suggests that the bow was rounded, although the surviving but much abraded Frame 4.5F shows evidence of a reasonably fine entry below the waterline.

These data were extrapolated to create a best-fit framework for a skeletal half-model of the hull which incorporated all the known information and what could reasonably be deduced from it. The framework was faired with plasticine and the hull-lines lifted from it (Illus 132–3). Helpful references were provided by Howard (1979), Lavery (1988), Kirsch (1990), Steffey (1994) and Adams (2013). Kirsch includes as an appendix the invaluable *Treatise on Shipbuilding* of *c* 1620, edited by William Salisbury from a manuscript in the Admiralty Library, originally published by the Society for Nautical Research in 1958.

No attempt has been made to apply formal contemporary rules for developing the hull-shape, since these are varied, often ambiguous, and (one suspects) rarely followed by practising shipwrights (Anderson 1947: 218–25; Naish 1958: 577; Unger 1978: 42). This was certainly the approach of West Country schooner-builders in the late 19th century, of whom Greenhill (1968: vol 1, 85) noted that 'no mathematical formulas … were used to indicate the line of development of various parts of the hull'. Each ship was shaped with reference to successful predecessors, with minor adjustments to enhance particular qualities or in response to a customer's requirements. Though tighter specifications in respect of warships had emerged at an earlier date, even as late as 1668 the 1,200-ton 1st-rate *Charles* had been built, according to the diarist John Evelyn (who was present at her launch), 'by old Shish, a plain, honest carpenter, master-builder of this dock, but one who can give

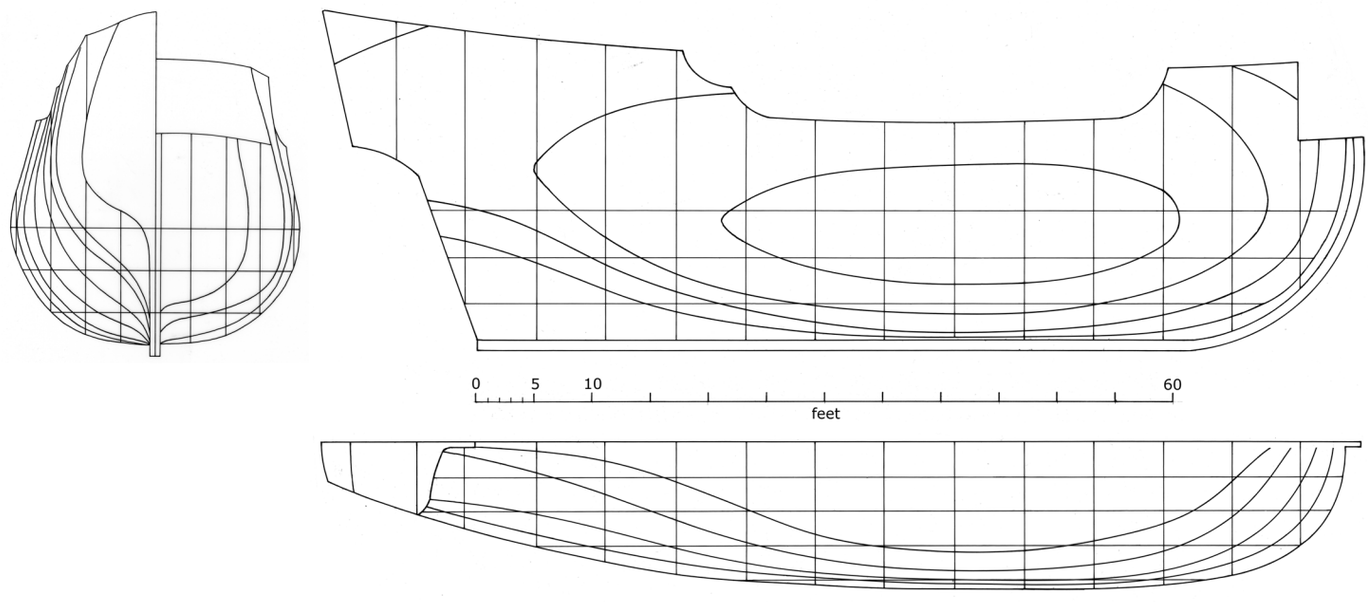

Illustration 133
Faired lines taken off the half-model in Illus 132

very little account of his art by discourse, and is hardly capable of reading, yet of great ability in his calling. The family have been ship carpenters in this yard above 300 years' (*Evelyn's Diary* vol 2: 41, 3 March 1668). It is likely that the Duart Point ship, whatever her origins, was based on a philosophy in which individual designs involved adaptation and adjustment within a familiar and well-tried envelope.

At any event, the vessel that emerges is strikingly similar in proportions and dimensions to the *Lion's Whelps*, a discrete category of small warships built for Charles I's navy (Thompson 1977). Their specifications are defined in a building contract of 28 February 1627/8, '10 pinnaces of aboute 120 tonnes a peece to be built with the most advantage both to row and sail' (TNA SP16/94). Their specifications are set out in Table 5.1 against those calculated for the Duart Point ship. It is relevant to note that the Duart Point figures were calculated before the author was aware of the *Lion's Whelps*' data.

5.2 Hull construction

The ship appears to have been built throughout of oak. The shipwrightry of the hull follows a broadly conventional pattern and is based on transverse frames bolted between the keel and keelson and planked internally and externally. The frames are made up of floor-timbers which run across the bottom of the ship. These are almost flat amidships but rise to accommodate the entry and run of the hull fore and aft. The floor-timbers overlap with futtocks which carry the curve of the hull around the bilge and up the side. Further futtocks and top-timbers may be presumed though none has survived.

Table 5.1
Comparison between the Duart Point wreck reconstruction and the *Lion's Whelps*

	Duart Point wreck reconstruction	Lion's Whelps
Length by the keel	60ft	60ft
Breadth between outside planks	25ft	25ft
Depth in hold (ceiling to deck-beams)	8ft	8ft
Rake forward	17ft (to top of stem	18ft
Rake aft	3ft (to main deck)	3ft
Oars (3 men per sweep)	18?	32
Armament	2 minion drakes 2 minions 4 sakers	2 sakers 4 demi-culverins 4 culverins
Burden ('Mr Baker's old way')*	120 tons	120 tons?
Displacement (calculated from the volume of the half-model)†	133.5 tons	?

* length × breadth × depth ÷ 100 (Oppenheim 1896: 266–9, citing *SPD* lv 1627: 39)

† Confusion has arisen in the past between modern concepts of displacement (ie the mathematically precise deadweight of a floating hull as represented by the volume of water it displaces at a given state of lading) and the arbitrary formulae by which contemporaries calculated cargo capacity or the overall size of a ship. These often-spurious figures, based on simple rules-of-thumb applied for purely administrative purposes, were influenced by many variable factors and different systems of measurement. Accurate estimates of displacement involve complex mathematics which only in modern times have been fully understood. The subject is definitively analysed and explained by Glete (1993: vol 1, 66–76 & vol 2, 527–30). The Duart Point ship's displacement is based on the volume of her reconstructed hull loaded to a draught of 10ft from the bottom of the level keel, calculated in cubic feet and converted to long tons of 2240lbs, seawater weighing 64lbs per cubic foot (Steffy 1994: 251–2). Variations in the draught and trim of the vessel would alter this figure. The displacement of the *Lion's Whelps* is not known, but given their similarity of dimensions it was probably close to that of the Duart Point ship.

Although almost all the frames are paired, in that each overlaps with the end of its neighbour, they are with one apparent exception not joined transversely and so most could not have been pre-erected to form a coherent framework or skeleton before being planked up. The exception is the Master-Frame ⊗. Where it emerges from between the outer and ceiling planks on the starboard side at **225.095** it sits hard against its neighbouring futtock, unlike any other of the paired floor- and futtock-timbers along the exposed starboard run. Although there was no visible evidence of these two timbers being fastened laterally in the short length of the joint-face available for inspection it is entirely possible that they were. If they were, the master-frame, and perhaps one or two others in suitable locations fore and aft, would have been constructed as free-standing entities which were pre-erected to form a template for the projected hull, no doubt defined and faired with ribbands (light battens).

Such a hull could have been assembled without its other frames being pre-constructed in one of two ways. In the first, the process would begin by laying the keel and erecting the stern and stem uprights. It would then be possible to plank up the lower hull without frames, the strakes being held together temporarily with cleats and clamps. Once the lower planks were in place the floor-timbers could be trimmed to fit and fixed to the planks with treenails. Although treenail heads are difficult to see in blackened and abraded timbers, especially under water, enough were recognised to indicate that the primary fastenings had been set diagonally in pairs at each frame/plank junction. The keelson could then be laid and iron bolts used to clamp keel, floors and keelson together. Bolts would be used elsewhere at points of particular stress (cf the plank-fastening pattern on the *Dartmouth* wreck (Martin 1978: 47–8; Batchvarov 2007).

Next the lower ends of the first futtocks would be pegged with treenails to the fixed planking, overlapping the upper ends, or rung-heads, of the floor-timbers. The process would be repeated, framing and planking inserted alternately under the guidance of the control-frames and ribbands, until the hull was complete. Structural cohesion of the developing hull would have been secured by the insertion of knees, deck-beams, and ledges at appropriate stages in the assembly. This type of construction was widely used by the Dutch in the 17th century (Hocker 2004: 82–3), and is well illustrated in a 17th-century print by Sieuwert van der Meulen (Groot & Vorstman 1980: 139) and described by Witsen in 1671 (Hoving 2012: 8).

Alternatively the floor-timbers could have been sandwiched between the keel and keelson along with the free-standing control-frames and bolted together before planking began. The first strake, or garboard, could then be rabbeted into the keel, and successive runs of planking added until the outboard ends of the floor-timbers were reached. Construction would then have proceeded as in the first method, with futtocks and planking built up in sequence. Though definitive evidence is lacking, it is likely that the latter method was used in the Duart Point ship. These techniques, which appear to be Dutch in origin, have been categorised as 'bottom-based' or 'frame-led' (Greenhill 1976: 71 fig 25; Hocker 2004: 82–4; Adams 2013: 58).

Where it could be measured the outer hull-planking was 70mm (2¾in) thick, and fastened to the frames with oak treenails 25mm (1in) in diameter, fashioned with a spokeshave. Driven into pre-drilled holes, these were tightened by oakum inserted into cuts in the outer ends to expand and lock them. The planks conform in general to three widths, 0.2m (8in), 0.33m (12in), and 0.45m (18in). No joints were observed in the outer planks available for scrutiny. Few of the outer planks could be examined other than the abraded ones along the outboard edges of the surviving structure. There are no indications of runs of thicker planks, or wales, which were normally provided for greater longitudinal strength inside and outside the hull, though these had probably been present higher up in the structure. Neither was there any evidence of sheathing, such as the light fir boards and tarred hair observed on the outer hull of *Dartmouth* (Martin 1978: 49–50), perhaps suggesting that the Duart Point ship's operations had been restricted to waters where shipworm attack was unlikely. Notwithstanding this, post-wrecking infestation by both shipworm and gribble has been considerable.

The ceiling planking, where it could be measured, is 57mm (2¼in) thick. Much of it was covered with clay, evidently to provide a cushion for the spread of gravel which served as ballast in the central part of the hold, and this has obscured many of the ceiling timbers. Two joints were noted in the ceiling, a butt-joint at **198.094** (Illus 134) and a diagonal scarf at **235.092**. The short planks on either side of the keelson are loosely fitted limber-boards, which could be removed to clear blockages in the run of water to the pump-wells (see also Chapters 3.2 and 6.3).

5.3 The decorated transom stern

Sufficient evidence has survived to attempt a hypothetical reconstruction of the transom structure and its decoration, and to postulate the breadth and camber of the main deck at its aftermost end. A substantial part of the panelled bulkhead at the forward end of the stern cabin has also survived, allowing an estimate of the breadth and camber of the main deck about 3m forward of its aft extremity. The latter calculation is complemented by an upper futtock or frame-timber at 9.95m aft in the run of the hull and this, together with surviving elements of the lower-stern assembly, allows a tentative reconstruction of the full hull-section at this point.

The artefactual material associated with the transom is considered first, followed by a description and analysis of the interior panelling. This information is then combined

Illustration 134
A butt-joint in the ceiling planking at the port midships turn of the bilge. Clay ballast lining is visible in the foreground. Targets set 1m apart (DP 173772)

with evidence from the lower framing and stern assembly to hypothesise a section of the hull towards the stern.

Carved decoration and related pieces

1 DP96/010, **011.003/041.022**, transom-beam 3.42m × 0.18m × 0.10m (Illus 135). Heavily eroded curved piece of oak with traces of carved decoration, particularly at the right-hand end, which appear to represent a central rosette in a rectangular field with four pellets in its corners (Illus 62). Mating faces at either end of the beam and four intermediate points at roughly regular intervals indicate six joints to uprights, of which the eroded remnant of one (also of oak) survives (third from left). Traces of hair-and-tar caulking were noted at the interface. The joints show evidence of iron fixings set in a quincunx pattern, while two more-substantial holes for bolts with countersunk heads are present between Joints 2 and 3 and Joints 4 and 5. The two central joints (3 and 4) are set almost vertically, while the outer ones angle progressively inwards (assuming the upward-curved edge of the beam to have been the top), reaching about 8° from the vertical at Joints 1 and

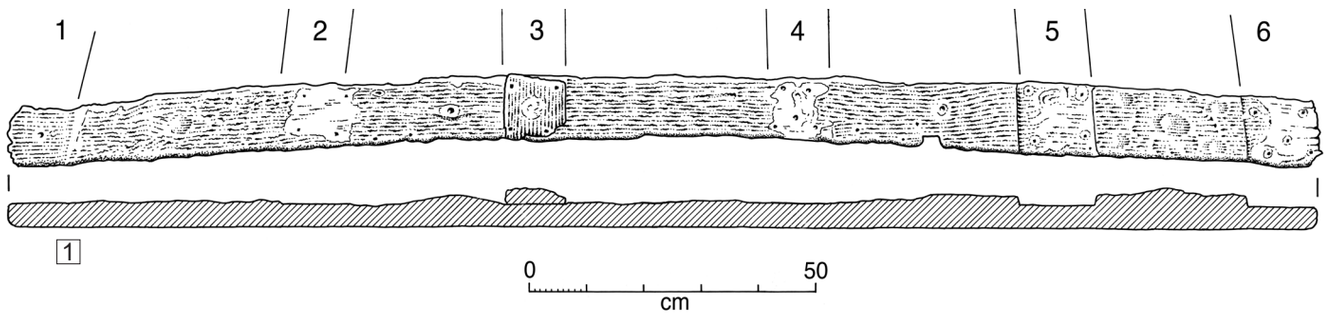

Illustration 135
Transom beam 1 showing six joint-faces. The third from the left retains a fragment of an original upright

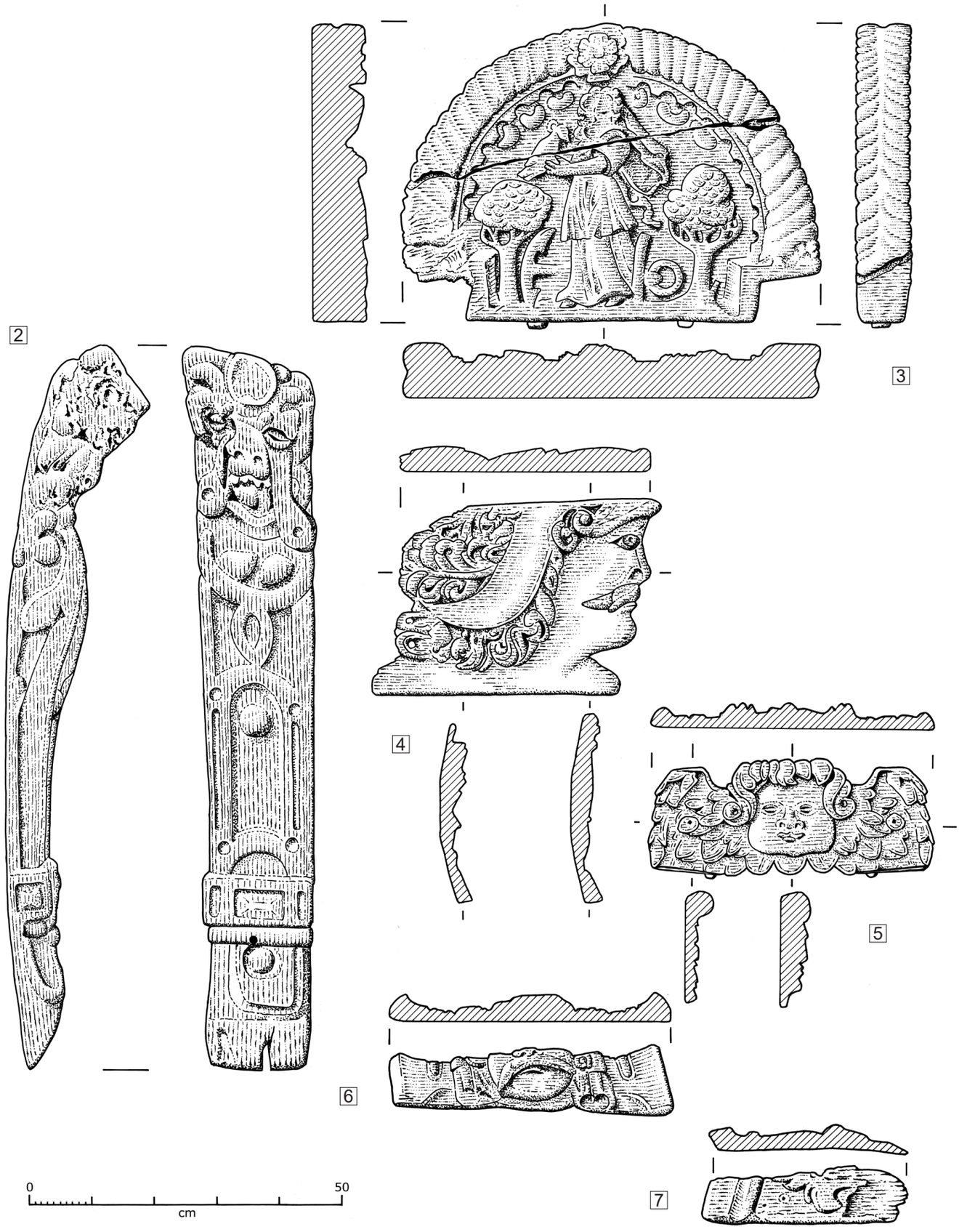

Illustration 136

Upright transom bracket 2 decorated with a lion's head and buckled strap; carving 3 depicting the Virtue of Hope with her attributes of bird, trees and anchor; carved head 4 of a helmeted warrior in the classical tradition; carved winged cherub 5; carving 6 showing the lower part of a moustachioed face with an Eastern-style headdress; fragment of carving 7

6. The decorative treatment of this component, and the symmetrical nature of its curve, identify it as an external stern transom-timber, while its length, at over half the ship's estimated maximum beam (6.28m), suggests that it defines the transom's maximum width and is consequently the main beam across the outer stern structure, close to the level of the main deck.

2 DP00/058, **092.082**, transom-bracket, 1.14m × 0.18m × 0.14m (Illus 136). A well-preserved timber of oak, curved longitudinally down its undecorated back. Its carved front and sides depict an asymmetrically placed lion's head with open jaws, with a buckled strap-terminal below. An abstract design with fluting, pellets and nulling lies between. This piece is closely paralleled by the lion's-head-and-buckle brackets in a contemporary representation of Charles I's *Sovereign of the Seas* (1637) (Illus 137). These support the ends of the stern's lower transom-beam. The curve of this component will thus define the curve of the counter which couples the lower stern to the transom.

3 DP00/081 and 083, **098.084**, tympanum, 0.66m × 0.47m × 0.084m (Illus 136), a substantial deeply carved piece of oak, its semi-circular upper border corded on both front and side. A rosette is placed at the top centre of the cording, and below the cording is an inner field of scalloped decoration. Within the frame stands a female figure in tunic and underskirt, with flowing mantle. A bird perches on her outstretched left hand. On either side is a foliated tree, while an anchor with ring and stock lies behind the figure, its crown pointing towards the left. These are the attributes of Hope as one of the three spiritual Virtues (Faith, Hope and Charity/Love). The bird is probably a dove, representing hope (as in the story of Noah's Ark), the trees symbolise longevity and strength, while the anchor is an emblem of security, its shape echoing the Cross with its message of salvation through divine grace.

This iconography has many parallels in Renaissance art, and a contemporary (albeit rather different) representation of Hope is one of the carved Virtues in the walled garden at Edzell Castle, Angus, which date to 1604 (Simpson 1931: 148–9, fig 36). The symmetrical shape of the piece suggests its placement on the central axis of the transom, while a notch in each lower corner indicates that it had been mounted on a pair of uprights or pillars. Two iron bolt-heads protrude from the underside. The space between the two notches (0.48m) closely matches the distance between the middle two upright joint-faces on the transom-beam 1 (0.44m), suggesting that supports rising from these had carried the Hope panel. A similar central tympanum symbolising Victory is shown on the stern of *Sovereign of the Seas* (Illus 137).

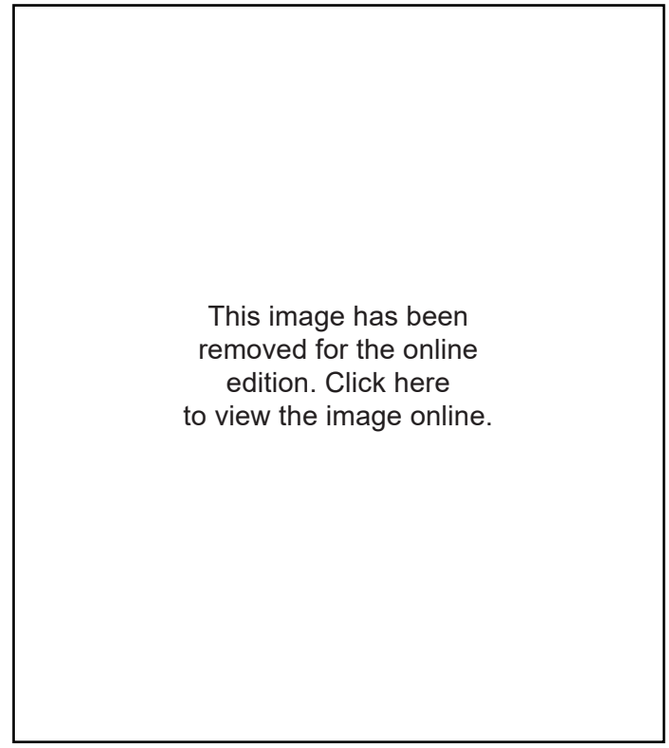

Illustration 137
The transom decoration of *Sovereign of the Seas*, built in 1637. Detail from a portrait of her builder, Peter Pett (National Maritime Museum, Greenwich, BHC2949)

4 DP92/DG01, *c* **10.10**, associated with the organic deposit exposed on the eastern part of the site (stern) during 1992 (Donald MacKinnon pers comm), an oak carving, in low relief, of a head in profile, 440mm × 310mm × 36mm (Illus 136). A moustachioed warrior of pseudo-classical form, with curled locks emerging from beneath the neck-guard of a peaked helmet, the top of which would have been continued on an adjacent board. An acanthus scroll beyond the neck-guard suggests that the helmet had been garlanded. This motif is common in 17th-century decorative contexts, for example a contemporary plaster-work roundel of a similar head depicting Alexander the Great at Craigievar Castle near Alford in Aberdeenshire (McKean 2001: 229), and another in the House of the Binns, West Lothian (Illus 146). Comparable but more elaborate three-dimensional wooden sculptures in the same *genre* have been recovered from *Vasa* (Naish 1968: 21–3).

5 DP92/169, **080.101** (information from ADU), winged cherub's head carved in oak, symmetrically presented in a frontal pose, 460mm × 192mm × 48mm (Illus 118, 136). In the drawing its partly damaged right wing has been

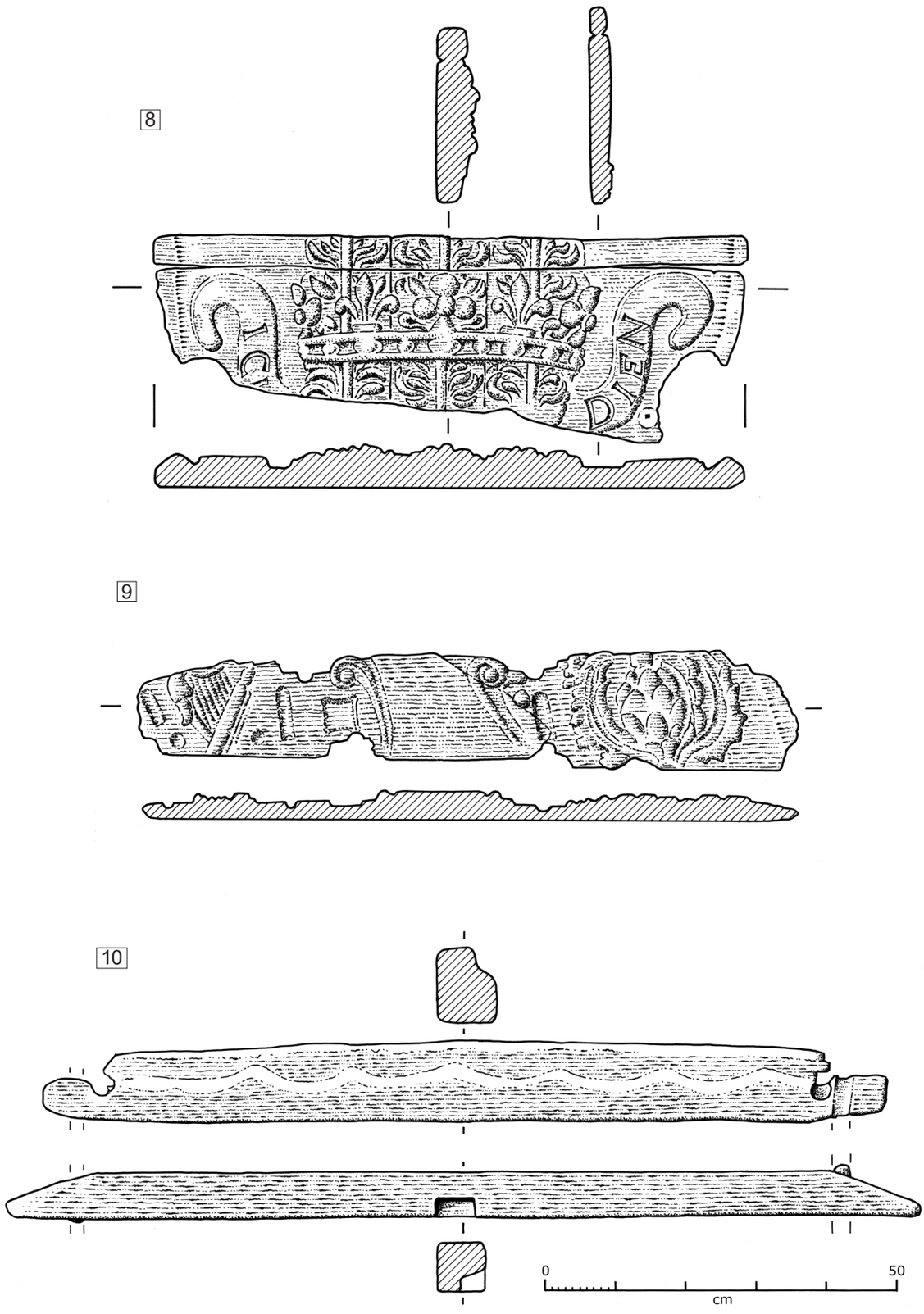

Illustration 138

The lower part of the badge of the Heir Apparent to the British crown 8, with its ICH DIEN motto; carving 9 with the harp and thistle emblems of Ireland and Scotland; two conjoining elements 10 of a support for a centrally placed feature, perhaps the Royal Arms

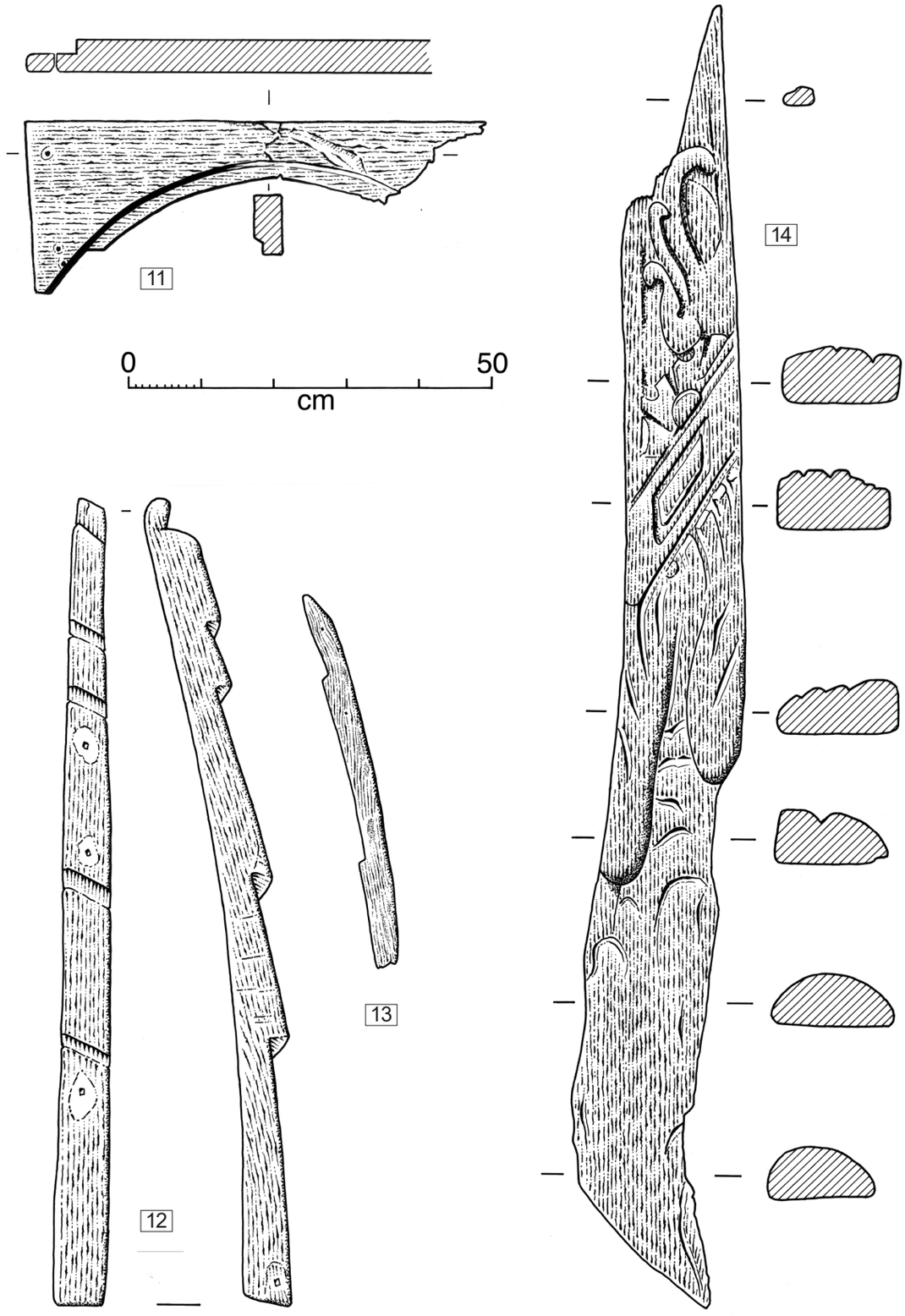

Illustration 139

11 part of a window arch; 12 quarter-gallery roof-frame; 13 smaller notched piece, probably related to a quarter-gallery roof; 14 long carving, probably a decorative transom edging

restored to balance the left. Nail-holes are present on each wing and two concreted bolt- or nail-heads penetrate the underside. Similar cherubs have been noted on the wreck of *Kronan* (1676) (Johansson 1985: 214), and are a frequent motif in contemporary decoration.

6 DP97/A025, **086.095**, lower part of a carved oak panel depicting a moustachioed face with eastern-style head-dress, 460mm × 160mm × 40mm (Illus 136). The angle of the sides suggests that the piece was designed to sit at a slope, perhaps following the camber of the transom.

7 DP03/062, **094.079**, bottom left-hand corner of a carved oak panel showing foliated decoration, 340mm × 88mm × 40mm (Illus 136).

8 DP92/200 and 201, *c* **16.05**, found loose on the eastern ballast-mound during the initial rescue operations (Steve Liscoe pers comm), part of an oak carving, 0.84m × 0.28m × 0.06m (Illus 138). Made up of two conjoining pieces in low relief, it shows the lower parts of three ostrich feathers enfiling a coronet with a scroll bearing the almost complete lettering of the motto ICH DIEN. This is the badge of the heir-apparent to the British throne (Scott-Giles 1958: 218). Its symmetrical character suggests a central location.

9 DP93/007, **225.053**, beneath the hull, close to the keel, two broken but joining oak carvings, 0.93m × 0.17m × 0.04m (Illus 138). On the right is an enfoliated thistle, while on the left is a seven-stringed harp of Celtic form (Scott-Giles 1958: 95–6), the national symbols of Scotland and Ireland. The emblems are separated by scroll borders and the piece is further embellished with deeply indented nulling. The orientation of the symbols suggests their placement in the design at a downward-angled or slightly reverse-curved set. This seems inappropriate for the transom display, and it is likely that the piece was located somewhere on the upper sheer of the ship's side.

10 DP03/079, **112.097**, two pieces of oak, joined when found, with all surfaces significantly abraded (Illus 138). The lower piece measures 1.36m × 0.068m × 0.068m, and is square in section with tapering ends. A rectangular recess 72mm wide and 36mm high is cut into the lower part of the outer face at its centre, penetrating half-way into the timber and tapering towards its inner end. An oak treenail 25mm (1in) in diameter pierces each end of the piece vertically at the inboard part of the taper. The upper piece measures 1.2m × 0.112m × 0.084m and has notched ends with holes which match the position and diameter of the treenails in the lower piece. There are holes for a horizontal treenail just inboard of the vertical treenail at each end. The piece is fronted by a deeply carved frieze of eight scalloped curves. In conjunction these pieces make up a horizontal assembly, and appear to be the supporting base for a major centrally placed decorative element. It seems likely that this would have been the arms of Britain's reigning monarch, the ICH DIEN badge's inevitable complement.

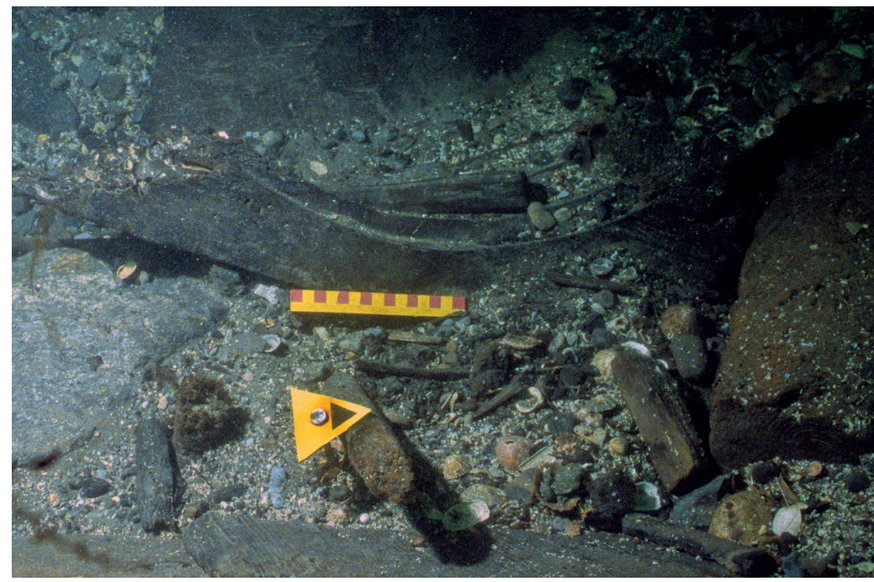

Illustration 140
Object identified as the upper part of a window arch 11, in situ. Scale 15 centimetres (DP 173917)

11 DP01/082, **178.093**, stern-window arch, 640mm × 240mm × 46mm (Illus 139–40). The top follows the arc of a

Illustration 141
Arched windows of the stern cabin of *Vasa*

circle 744mm in diameter, with a 24mm rebated surround 12mm deep. The downwards angle on the left runs 4° inwards from the vertical, and while the right-hand corner is missing, the geometry of the arc suggests that it was close to the present end. It can be calculated that the arc, when complete, encompassed 160°. The tip of the bottom left-hand corner is also missing but a projection of the arc to meet the side suggests that the timber's height on that side was *c* 350mm. Down the back of the left-hand side, and presumably on the missing right also, there is a 20mm × 64mm recess, no doubt for fastening this component to uprights on either side. There is a single nail-hole at the top left-hand corner, and two at the bottom left, close to the point.

A close parallel to this object is seen in the upper stern window range of *Vasa*, immediately above the royal arms (Illus 141), though in the case of *Vasa* these arches are embellished with relief carving. Their downwards angles are splayed to accommodate the flare and camber of the transom's geometry, echoing the deviation from the square noted on the Duart Point example. On these grounds, and the fact that the arc dimensions are virtually identical to the width of the Hope pediment, which it has been hypothesised was set in a central position immediately above the range of windows, it is concluded that this component is part of the top arch from one of the stern windows.

This type of window reflects an architectural tradition rooted in the classical Palladian movement, introduced to Britain in the early 17th century by Inigo Jones following his extensive continental tours. After his appointment as Surveyor General of the King's Works in 1615 he undertook numerous commissions for both James I and Charles I, of which the most important was the building of the Queen's House at Greenwich (1616–35) (Hart 2011: 162–6). The central upper-floor window of its north front is an excellent early example of an arched window in the Palladian style. That the feature was introduced to ships about the same time is evidenced by *Vasa* (1628), *Sovereign of the Seas* (1637), and now by the Duart Point ship (*c* 1640?). It continued well into the 18th century (Gardiner 2012: 40–1).

12 DP00/199, **085.095**, quarter-gallery roof-frame, 1.13m × 0.076m × 0.072m (Illus 139). This curved oak timber is notched to receive five overlapped planks of varying widths. The (presumed) top end is formed into a hooked protrusion, and the thickness increases from top to bottom. There is a nail-hole in the bottom notch, two nail-holes in the third one up, and another fixing-hole in the lower side. This can be identified as a quarter-gallery roof-frame, springing outwards from the side of the transom to increase space in the after cabin and provide

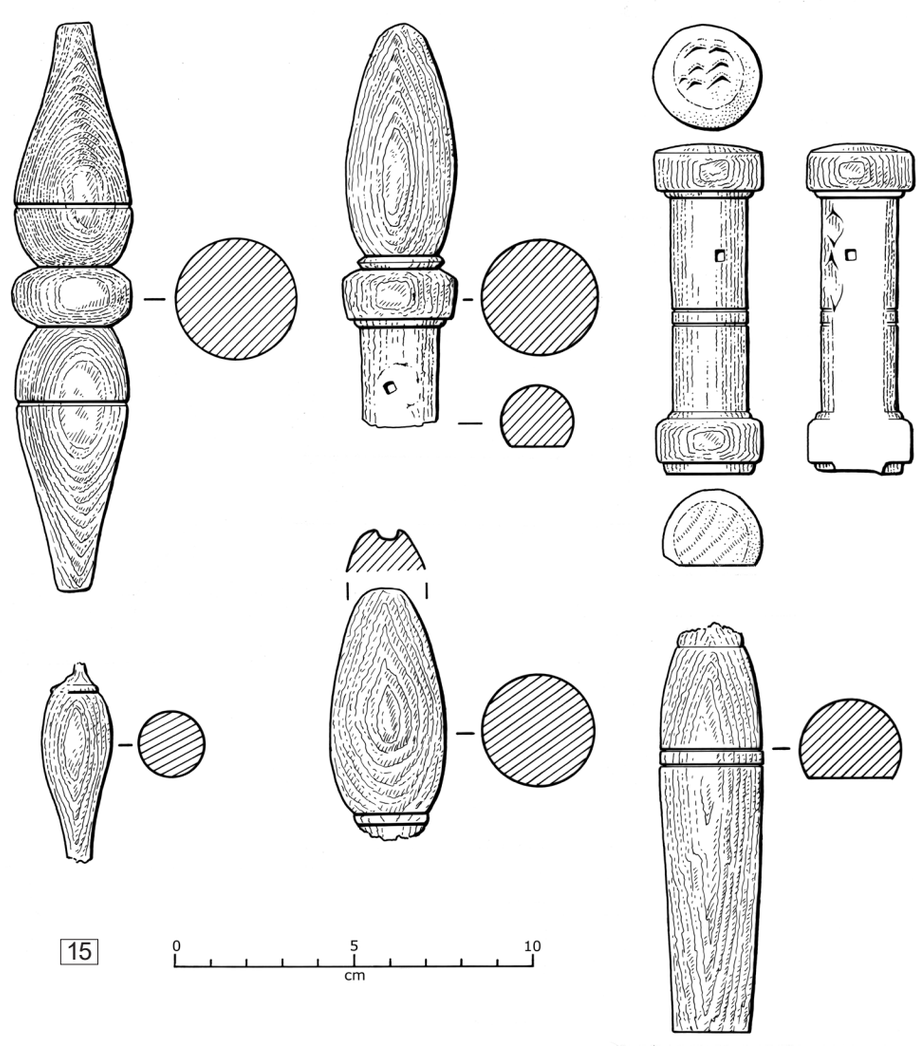

Illustration 142
Turned decorative items 15 (DP 174901)

Illustration 143
H-sectioned window-glass joiners, or cames 16, found in the vicinity of Gun 8 (DP 174189)

its occupant(s) with private sanitary facilities directly through the floor (Simmons 1998: 54–6). Quarter-galleries with overlapping-planked roofs survive on *Vasa* (Cederlund 2006: 165).

13 DP92/???, findspot uncertain, broken curved timber, 530mm × 42mm (max) × 10mm, with rabbets cut to over-ride three overlapping planks (Illus 139). It is best identified as part of an external rib set over the quarter-gallery roofing, possibly related to 12. Decorated ribs fulfilling this function are evident on *Vasa* (Cederlund 2006: pl 5).

14 DP92/161, **061.084/065.099**, long and slightly curved oak piece, carved with a foliar motif and a petalled flower crossed by a diagonal feature, 1.74m × 0.176m × 0.084m (Illus 139). It would be appropriate as an edging to the upper sweep of the after deck, the beakhead, or the transom surround. The context makes the transom the most likely.

15 DP92/DG09, findspot uncertain, five examples from 13 turned decorative elements (Illus 142). The pieces were reportedly found in a discrete and tightly contained group and no others have been found since. All are of black locust (*Robina pseudoacacia*), a North American species. Three are of full circular cross-section, while another has a circular-sectioned finial while the shank below has a slightly flattened face (there is another example without a shank). The fifth example is complete, and is cylindrical with wider collars at each end. The upper collar (as drawn) is of full circular section, but below it a flat face has been created by removing about one third of the circumference and continuing to the lower collar (three other incomplete examples also have flattened collars). These objects are inappropriate for creating the low-relief decoration postulated for the turned pieces applied to panelling, described below (35, Illus 155). They may perhaps have been elements of the ship's external decoration but, in view of their small size and the apparently exclusive grouping in which they were found, they could also be parts of a single decorative feature or a piece of furniture.

16 DP00/018b, **087.109**, concreted to the oar-port lid attached to Gun 8, a 90mm square of window-glass, with its lead surround (Illus 81). Nearby three pieces of lead window-cames (grooved joining-bars) were found (DP99/070 and 102) (Illus 143). Another piece (DP99/117) was visible within a surface find of concretion. These elements undoubtedly come from the stern-cabin windows.

Porthole, no finds number (not raised), **091.095** (Illus 75). During excavation a well-crafted piece of wood 12mm thick and 300mm (1ft) square, with a 150mm-diameter centrally placed circular hole was recorded and left in situ. It lay in a stable layer beneath the breech end of the minion drake gun-carriage and the complex of wreckage which incorporated the panelled door 17 and the associated run of wall panelling 21. It is paralleled by similar pieces set into *Vasa*'s stern (Cederlund 2006: fig 5.15) (Illus 144). They would presumably have been closed with wooden blanks (deadlights) during storms. On the reconstruction below (Illus 147), one on either side has been postulated (there were two each side on the much larger *Vasa*). They may probably be identified as hawse-holes set at each stern quarter for facilitating anchoring operations. Corresponding holes can be assumed at the bow. Contemporaries called them 'cat holes' (Manwaring & Perrin 1922: 122).

Charles I was crowned King of Scots at Holyrood Palace in Edinburgh in June 1633, seven years after his English coronation at Westminster. In preparation for his visit many Scottish notables decorated their houses with loyal plasterwork incorporating Scotland's royal arms and related

Illustration 144
Portholes on the stern of *Vasa*

Illustration 145
The Arms of Scotland, 1633, decorative plaster at the House of the Binns (Edward Martin)

iconography, together with other decorative features. Several examples survive, providing closely contemporary parallels to the Duart ship's carvings. They include Winton House near Haddington in East Lothian and Craigievar Castle near Alford in Aberdeenshire (McKean 2001: 200 and 229). The King's Room in the House of the Binns near Linlithgow, west of Edinburgh, has particularly fine examples of the royal arms (Illus 145), the harp, thistle, and other national emblems of Stewart monarchy, and classical adornments such as a head of Alexander the Great (Illus 146).

Reconstructing the transom

The above elements can be combined to provide a hypothetical reconstruction of the transom assembly which accommodates them within an envelope appropriate to the suggested proportions and dimensions of the ship (Illus 147). It should be emphasised that this is a 'best fit' solution, and other

Illustration 146
Top: emblems of Stewart kingship on a plaster ceiling at the House of the Binns; rose (England), fleur-de-lys (unrealised claim to France), harp (Ireland) and thistle (Scotland). Bottom: roundel with the head of Alexander the Great (Edward Martin)

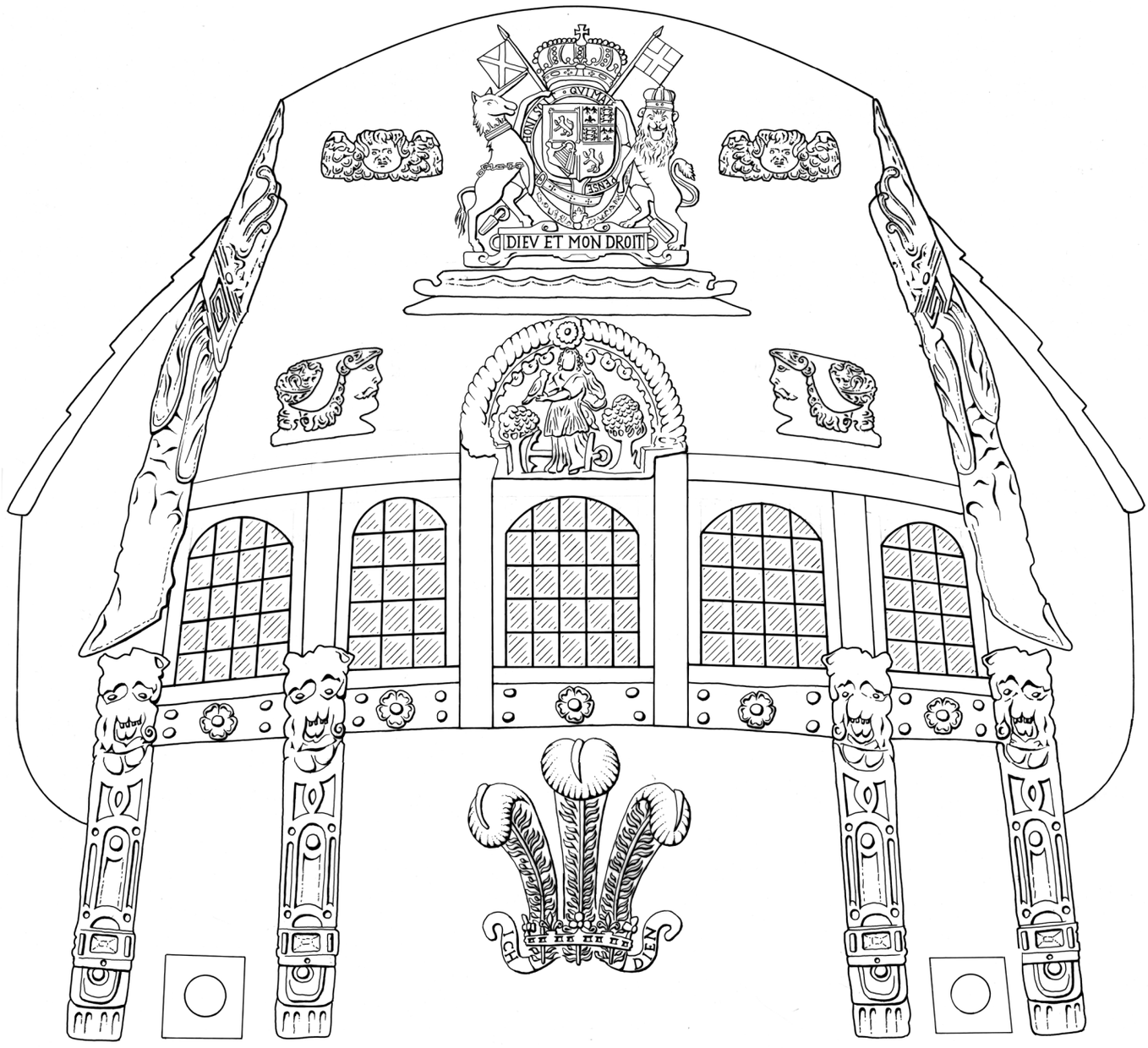

Illustration 147
Speculative reconstruction of the transom decoration

interpretations are possible. The controlling piece is the curved transom-beam. This can confidently be placed athwartships at or close to upper-deck level, where it defines not only the beam at this point but also the camber of the deck. Its starboard joint-face mates naturally with the lion-headed transom bracket, the angles of contact suggesting that the bracket is the starboard outer one (Joint 6). A matching bracket can be assumed on the port side (Joint 1). Two more can logically be placed at Joints 2 and 5. The curved rear faces of these brackets define the curve of the counter. It is suggested that the two centre Joints, 3 and 4, might carry the upright pillars or supports bearing the Hope tympanum. A similar arrangement is shown in an early 18th-century shipwrightry treatise (Sutherland 1711: 98).

This geometry provides a framework for five stern windows of leaded glass. The heir's badge, its symmetrical design requiring a central position, neatly fits the middle of the counter above the rudder-head (its location on *Sovereign of the Seas*) while leaving spaces for a hawse-hole on either side.

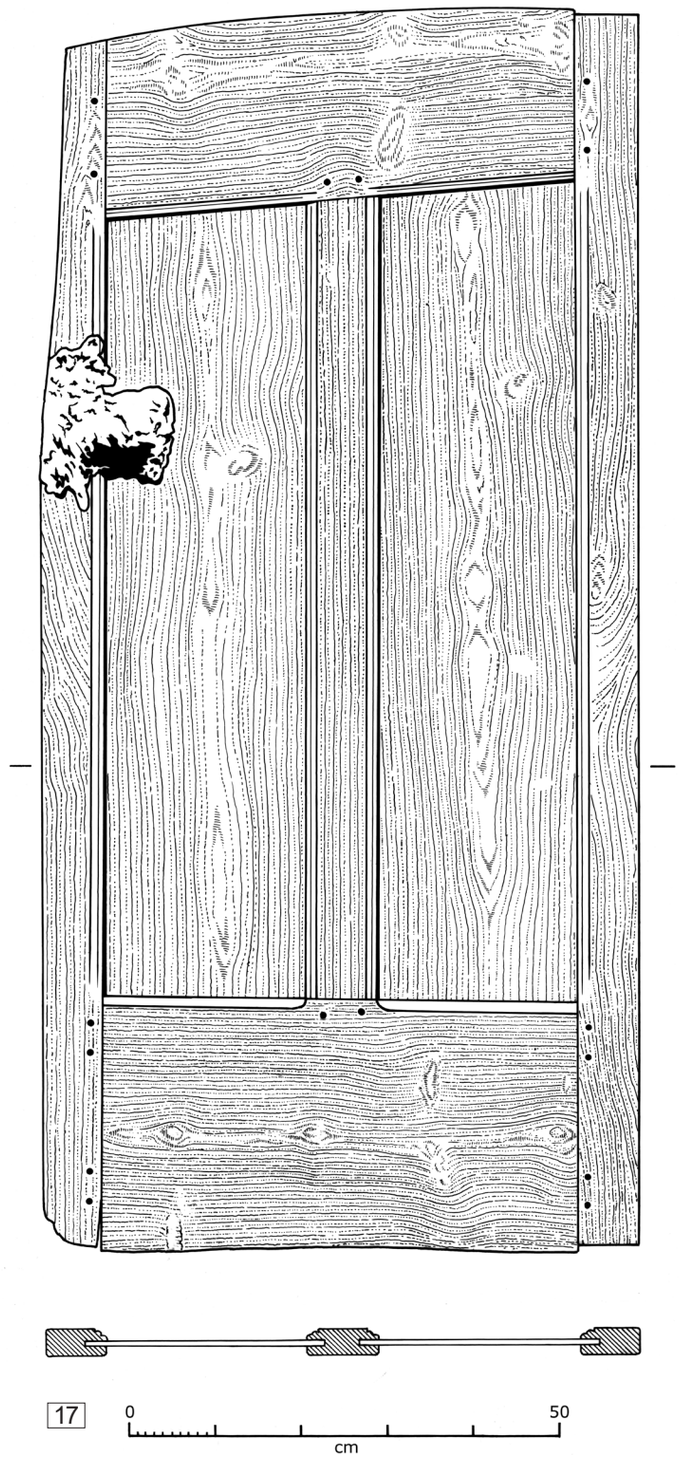

Illustration 148
Framed-and-panelled door 17, presumably associated with the stern cabin

Below, at the stern end of the main gun-deck, we may postulate two minion drakes, pointing aft through the transom. Distances between the decks, and the height of the aftercastle, are determined by calculations of proportions and dimensions considered above. The top of the Hope tympanum touches the level of the upper deck, and above it we may suppose the only other surviving symmetrical element, the scalloped footing above which may be postulated the royal arms. The proportions of the arms will then define the probable extent of the transom at its highest point.

The upper side of the transom is an appropriate location for the decorative edging-piece, here allocated the starboard position with a matching one to port. Rather similar carvings occur in this location on *Vasa* (Hocker 2011: 75). Next the quarter-gallery roof-frame, again seen as one of a matching pair, provides a basis for positioning these outboard structures. Warrior heads and cherubs have been added to fill the empty fields, as they no doubt did on the original, though not necessarily in the locations suggested.

5.4 The aft cabin interior

Panelling

17 DP00/146, **083.090/094.088**, framed-and-panelled door, 1.44m × 0.7m × 0.021m (Illus 72, 148). This intact composite object was located within the collapsed stern complex, overlain by the run of panelling 21 between **091.094** and **094.084**. This in turn was overlain by the gun-port lid at **088.087**, the wooden chest at **096.090**, and the structural timber running between **086.082** and **107.091**.

It is a two-panelled door of pine with deep top and bottom rails (0.21m and 0.29m respectively). The stiles and muntin are 0.08m wide, though the left-hand stile narrows towards the top. The two panels are of carefully selected pine, derived from the centres of mature trees. The grain, however, though balanced, does not match. The panels are of a constant 12mm thickness. Rails and muntins are secured with mortice-and-tenon joints, locked with 8mm oak pegs. 0.96m from the bottom of the door on the left-hand side are the concreted remains of a handle or lock, while there are traces of two hinges on the right. As the entry and exit marks of the moulding-plane show, mouldings on the inner edges of the rails and stiles were shaped after assembly, though the muntin was cut from previously prepared stock. This suggests that the door was built on the spot during the fitting-out process, the dimensions and adjustments to its shape being determined by existing structural criteria as the work progressed.

The door is slightly asymmetrical, its upper curve presumably accommodating the camber of the deck above. Its left side is slightly lower than the right. There is

a slant of some 5° in the same direction along the top rail's straight bottom. The lower rail is set horizontally, though its lower edge, which is somewhat worn, has a curve which matches, though rather less sharply, the top curve of the door. The stiles and muntin are vertical.

At 1.45m (4ft 9in) the door seems unusually low for normal use, even allowing for the cramped conditions on board ship. However a deep sill or raised coaming may be postulated beneath it, to stop ingress of water to the cabin when seas encroached on the upper deck. To be effective such a sill would need to be about 0.3m (1ft) high, making the overall door clearance a more respectable 1.75m (5ft 9in). It should be noted that the top edge of the lower rail is not finished with a moulding but with a simple chamfer, to encourage the more efficient shedding of water. Allowing a further 9in (0.23m) for the head of the door-frame, a cabin height of 6ft (1.83m) between the upper and quarter-decks may be postulated.

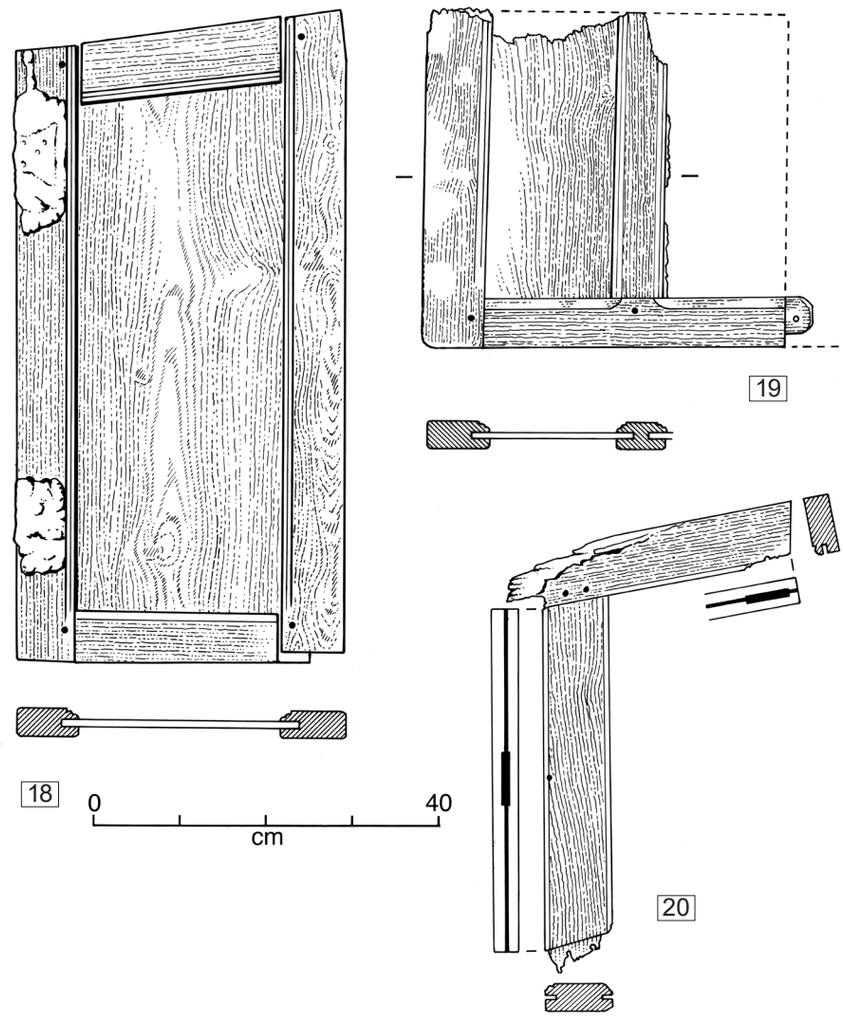

Illustration 149
18 single-panelled cupboard door (DP 174891); 19 surviving elements of a panelled cupboard door (DP 174892); 20 muntin and stile set at an angle to accommodate the lack of right-angles within a ship

18 DP99/004, **077.103**, cupboard door (Illus 73, 149). This small framed single-panel pine door measures 0.74m on its longer stile and has a constant width of 0.38m. It lay among the collapsed stern complex 1m south-east of the door 17 sandwiched between well-finished planks, some of which had mouldings on one or both of their edges, indicating that most of this material came from the interior lining of a cabin. The door has five components – top and bottom rails, two stiles, and a panel 8mm thick. It has pegged mortice-and-tenon joints in the manner of the other doors. Its inner mouldings have been shaped with a moulding-plane with little care taken to stop inside the corners. The panel-board is cut to show the centre grain. There are the concreted remains of hinges on the shorter side. The angle of the top rail is 7° from the horizontal, slightly greater than that of door 17. Otherwise it has been built on the square.

19 DP00/201a, **094.096**, cupboard door (Illus 74, 149) 452mm × 394mm. Part of the lower half of a framed-and-panelled door, buried beneath concretions adjacent to door 17 above. The lower rail (identified by its chamfered bevel) survives, joined to the left-hand stile and lower muntin. The left-hand tenon is intact, while the lower muntin is complete apart from its upper tenon, which has broken off flush with the shoulder. Most of the right-hand panel, which is 9mm thick, is in place, while fragments of the left-hand one remain in the muntin groove. A middle lock-rail can be assumed, suggesting a four-panelled door, and if the upper and lower halves are of the same depth a full height of 0.82m can be calculated. Even with a raised sill this is far too low for human access, a conclusion borne out by its reconstructed width of only 0.5m. It is better identified as a large cupboard door. The lower edge

is angled at 2° from the horizontal, a skew which does not match the 5–7° deck camber postulated for the other two doors, and it may be suggested that this door was not mounted athwartships but on the fore-and-aft axis of the hull. The lesser angle would accommodate the gentle upwards sweep of the deck as it curved towards the stern.

20 DP92/019, **06.07**, articulated muntin and rail with angled joint (100°) (Illus 149). Overall dimensions 0.52m × 0.32m. One complete mortice-and-tenon joint survives, together with two mortice slots and one damaged tenon. The angle of the joint matches the top slope of bulkhead 21.

21 DP00/085, **091.094/094.084**, run of muntins and panels, 1.11m × 0.92m × 0.91m × 0.92m, thickness of panel 8mm (Illus 150). This lay above door 17 and beneath the gun-port lid and wooden chest 110. It consists of three trapezoidal panels linked by three muntins, and the vestigial remains of a fourth. The right-hand panel is angled inwards at 15°, and retains a fragment of a similarly oriented stile. This is evidently the outboard edge of a panel-clad bulkhead associated with the stern cabin, so the angle represents the tumblehome of the aftercastle at this point. All the upright muntins have their upper and lower tenons intact, each *c* 70mm wide and 30mm deep. Each is drilled for two 7mm-diameter pegs.

The top edge of the panelling slopes outboard at an angle of 10° below the horizontal, evidently reflecting the camber of the half-deck that may be presumed to have rested above it, with the missing upper rail secured to one of its beams. The lower edge of the panelling runs at right-

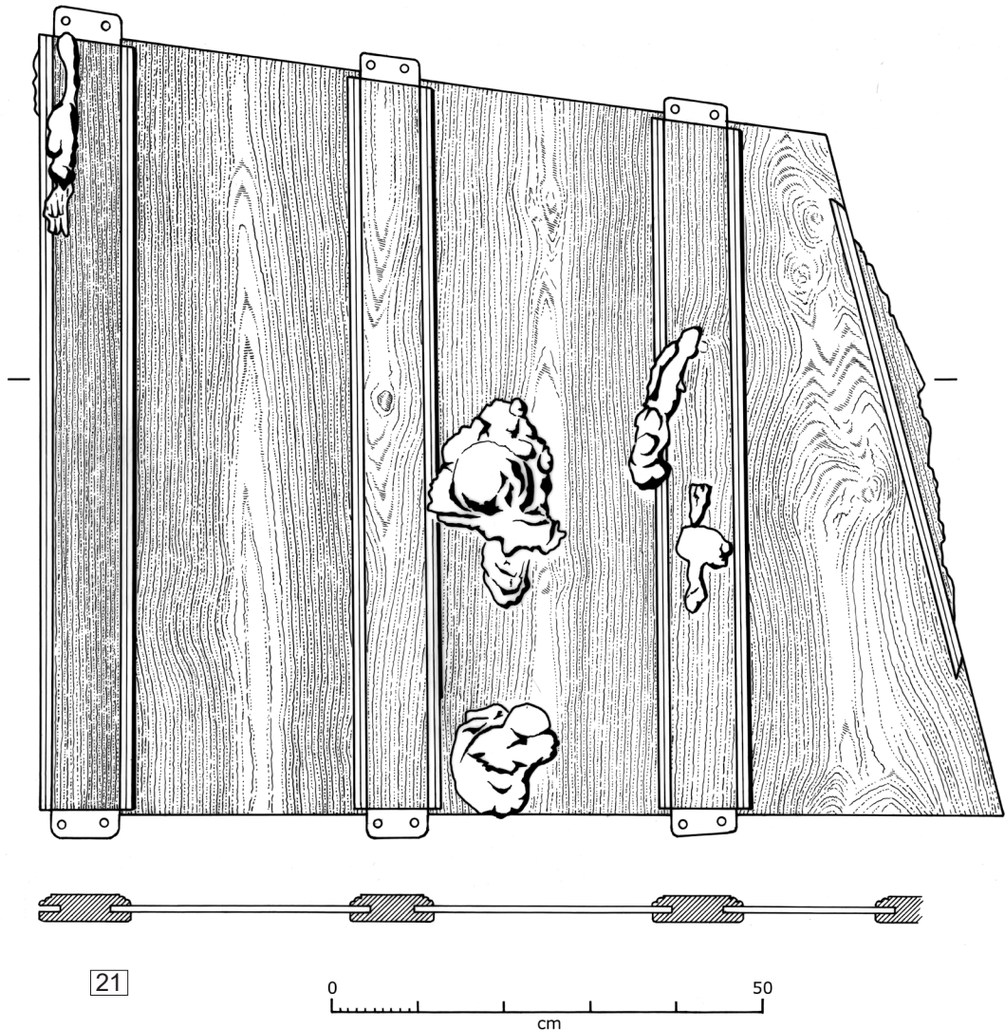

Illustration 150
Run of muntins and panels 21, evidently from a bulkhead (DP 174888)

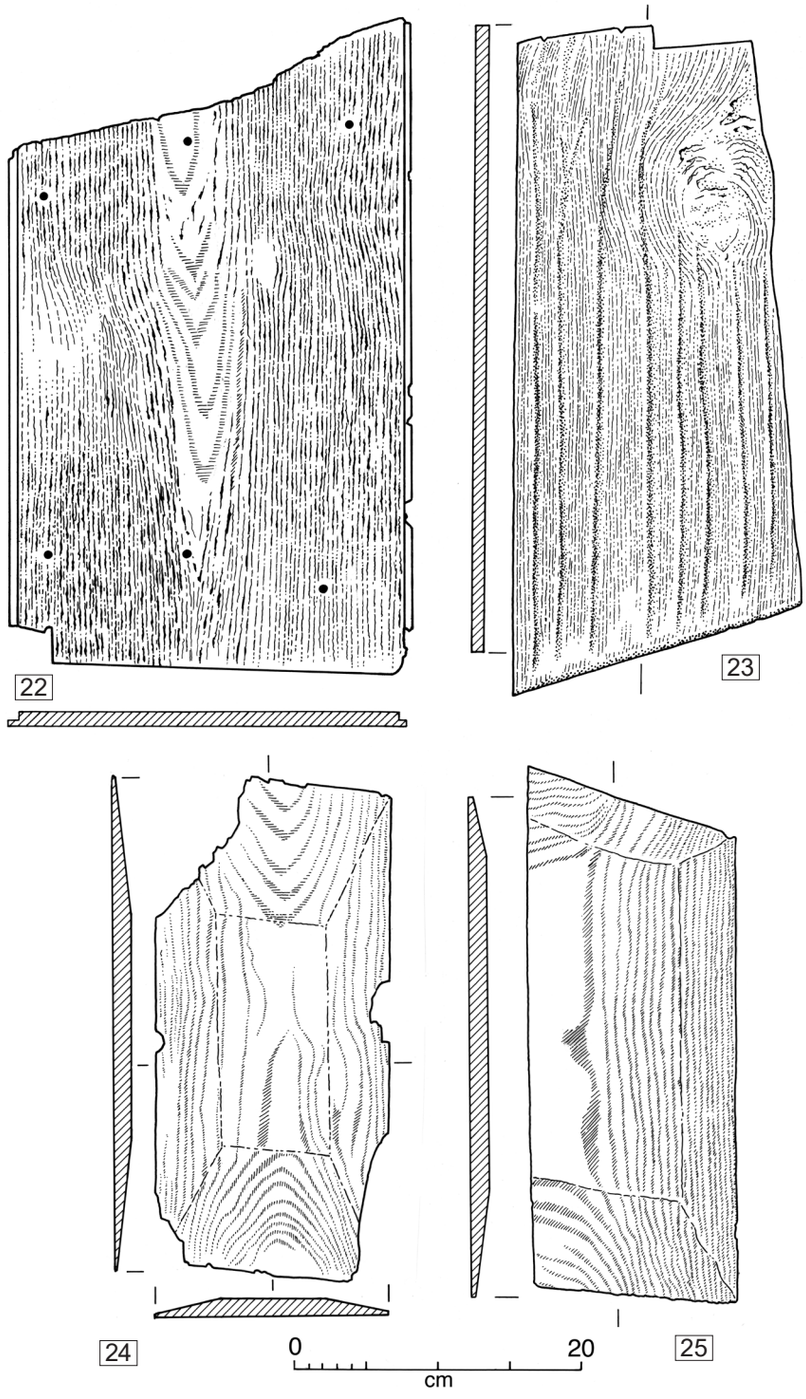

Illustration 151
Pieces of flat panelling 22–3 and raised and fielded panelling 24–5

angles to the muntins, indicating that this was a horizontal line in the construction. A level mid-rail can be postulated to receive the lower tenons, and if there was a run of panelling of similar depth below it, finished with a skirting to match the camber of the deck, the dimensions would closely match those of door 17 and its postulated sill to give a height between decks of around 1.8m (5ft 11in).

22 DP99/055, **067.107**, broken pine panel, one end intact, 450mm × 280mm × 10mm (Illus 151). The long edges are cut to form L-shaped flanges. Six 6mm peg-holes are evident. The use of a centre-grain pattern suggests that the object is associated with decorative panelling.

23 DP95/001, findspot uncertain, broken pine panel with a corner and parts of two edges intact, 450mm × 200mm × 7mm (Illus 151). The face shows evidence of preparation using an adze which has left a pattern of shallow parallel troughs on the surface. A knot has caused the worker some difficulty in maintaining this effect. The surviving corner is angled at 73°.

24 DP99/089, **082.103**, raised and fielded trapezoidal pine panel 340mm × 160mm × 12mm (Illus 151). The grain of the timber has been carefully exploited to achieve a symmetrical pattern.

25 DP99/044, **068.105**, raised and fielded trapezoidal pine panel, one edge broken off, present measurements 340mm × 140mm × 13mm (Illus 151). Patterning of the grain is markedly less balanced than in 24 above.

26 DP92/030, findspot unknown, pine stile, 420mm × 80mm × 26mm, tenons at either end each drilled for two pegs (Illus 152). One edge is moulded and slotted for a 5mm panel; the other edge is squared. In the middle of the slotted edge is a 60mm × 8mm mortice from which the tenon has broken out leaving a tapered oak peg in place (Illus 153). The end tenons are set at an angle of 10°. Probably the side timber of a small panelled door. Two parallel rows of round stain marks may derive from contact with the bristles of a brush.

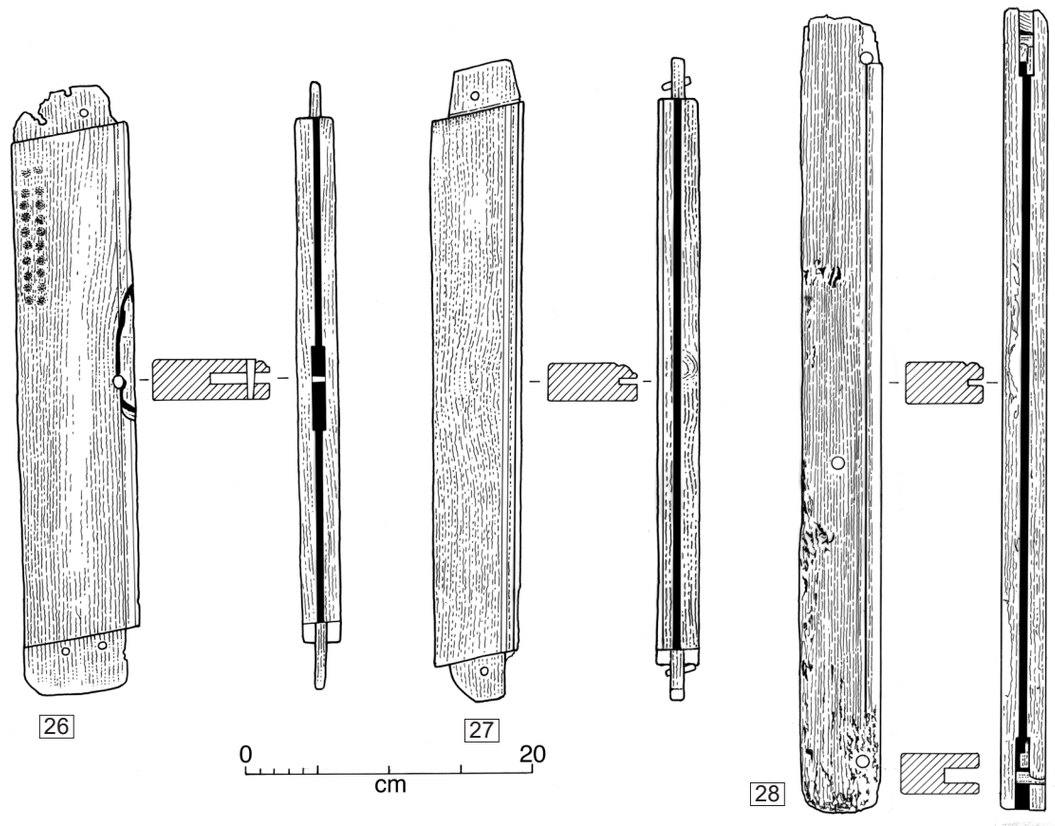

Illustration 152
Elements of moulded panel framing 26–8

Illustration 153
Joint in moulded panel frame 26

27 DP92/173, findspot uncertain, pine stile 450mm × 60mm × 30mm (Illus 152). Similar to 26 except the end tenons are drilled for single pegs, both of which (of oak) remain in situ, and there is no central mortice in the panel slot.

28 DP02/017, findspot uncertain, pine stile, 560mm × 56mm × 32mm, one side has a moulded edge slotted for a 6mm panel, with pegged mortises at each end (Illus 152). The other edge is square, and like 26 and 27 was probably the side of a small panelled door.

29 DP92/036, findspot uncertain, pine muntin 600mm × 58mm × 32mm, slotted on both sides for 5mm panels, and moulded along both upper edges (Illus 154). Fragmentary 10°-angled tenons at each end.

30 DP92/170, findspot uncertain, pine muntin 506mm × 60mm × 32mm, slotted and moulded as 29 (Illus 154). Fragmentary 8° angled tenons at each end.

31 DP92/174, findspot uncertain, edge fragment of pine plank with beaded moulding, surviving length 260mm × 24mm × 10mm (Illus 154). Two nail-holes evident.

32 DP99/013, **054.101**, on top of cupboard door 18, length of pine plank abraded at both ends, 500mm × 600mm × 6mm, with two moulded edges (Illus 154). Three nail-holes evident.

33 DP92/034, findspot uncertain, broken fragment of pine plank 174mm × 60mm × 8mm, moulded on both edges (Illus 154).

34 DP95/004, **091.086**, angled end of pine plank, 340mm × 100mm × 10mm (Illus 154). The moulded edge angles inwards at 25° while the straight edge is flush.

35 DP97/A018, 029, 030, 036, DP99/056 (**069.108**), DP99/116 (**073.096**), five of six decorative wooden pieces associated with the panelling from the collapsed debris of the stern (Illus 155). One of them (top middle) was found in situ on a piece of dressed and moulded wood to which it had presumably been glued, although no trace of the adhesive had survived (Illus 69). All were of pine (*Pinus* sp) and somewhat less than semi-circular in cross-section. They are evidently slices of fully circular pieces turned on a lathe, and it may be suggested that the blanks were made up of two outer strips separated by a shim to which they were glued, the inner strip serving as a spacer while the two outer ones formed paired finished products. It may be supposed that the adhesive was water-soluble to facilitate separation.

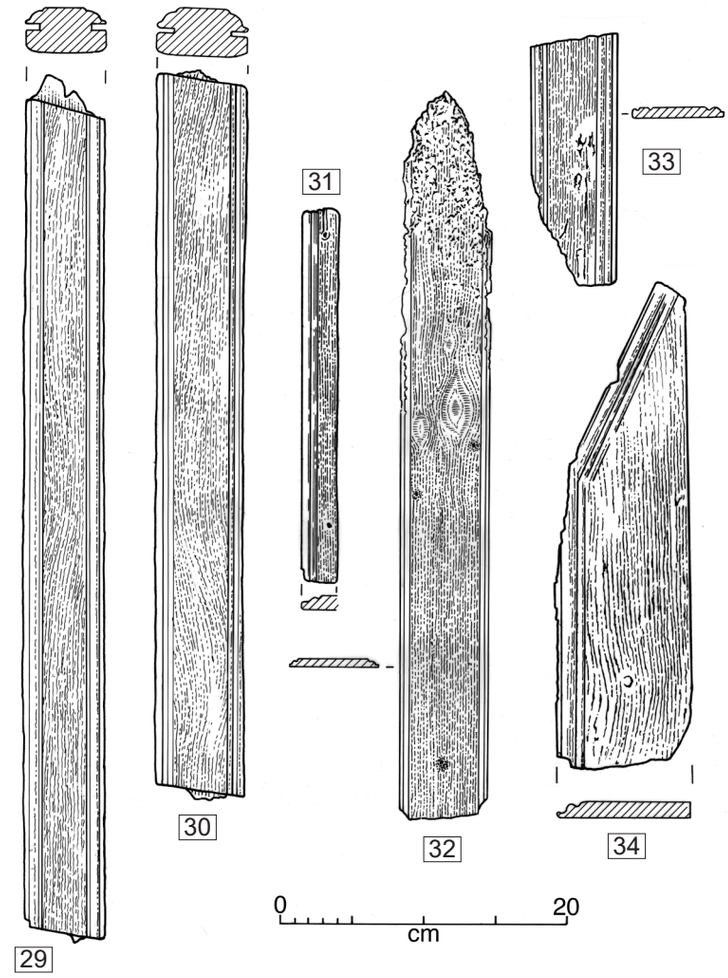

Illustration 154
Moulded panel framing and edge-moulded planks 29–34

36 DP92/124, findspot uncertain, 330mm × 275mm × 26mm, trapezoidal wooden board with evidence for hinges, possibly a lid for a locker (Illus 156).

37 DP92/067, findspot uncertain, 435mm × 200mm × 15mm, trapezoidal wooden board with evidence for hinges, possibly a lid for a locker (Illus 156).

Reconstruction of the forward bulkhead of the aft cabin

As explained above, the framed-and-panelled door 17 can reasonably be identified as the main entry to the aft cabin. Its upper curve shows that it was asymmetrically placed, no doubt to avoid the mizzenmast, which would have occupied the centreline of the deck immediately forward of it. The low height of the door – 1.4m (4ft 7in) – might be explained, as suggested above, by the presence of a coaming to prevent water ingress from the upper deck. A height of 0.4m (1ft

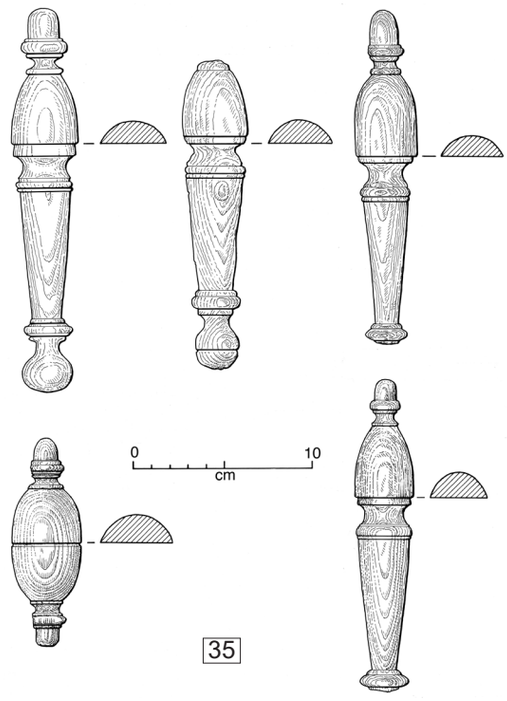

Illustration 155
Decorative elements 35 with flat backs for gluing to panelling (DP 174893)

4in) is hypothesised for this feature, to accommodate a cabin height of 1.8m (6ft). Alternatively the cabin deck may have been stepped down from the level of the upper deck to increase headroom, as postulated in the reconstruction of *Susan Constant* (Lavery 1988: 58–9).

The run of articulated panelling 21, with three complete muntins and the remains of a fourth at its angled outboard end, is clearly part of an athwartships bulkhead. Fragments of a fourth panel survive in the groove of the inboard surviving muntin, indicating at least one further panel before the door is reached. If the panelling thus restored is set beside the offset door, and the high point of the door's upper curve regarded as the centreline of the bulkhead, the insertion of the three outer panels, reversed, would balance the four starboard-side panels of the postulated structure (Illus 157). By projecting the structure downwards against the criteria discussed above, a speculative reconstruction of the bulkhead emerges. This gives a beam (measured internally) of 4.06m (13ft 5in) for the upper deck, and 2.92m (9ft 8in) for the presumed quarter-deck above.

It may be supposed that the sides and stern end of the cabin were similarly panelled. Cupboards represented by the framed-and-panelled doors 18 and 19 were no doubt incorporated, and there would have been access to the quarter-galleries on either side. The placement of the various individual panels, moulded woodwork, and applied relief decoration cannot be determined, but they emphasise the complexity and skill involved in three-dimensional precision carpentry where levels and right-angles are not the determining factors. Smith (1627: 12) notes that cabins were provided with 'many convenient seats or lockers to put anything in, as in little cupboards'.

5.5 Oar-port lid

38 DP00/018a, **087.109**, concreted to the body of the minion drake by its iron hinges, a well-preserved wooden lid made of oak (*Quercus* sp) (Illus 81, 158). The outer part of the lid is composed of a slightly trapezoidal piece 44mm (1¾in) thick, 260mm (10¼in) high, and 324mm (12¾ in) wide. A 58mm (2¼in) strip of the same thickness and width spans the top, making a total height of 318mm (12½ in). On both outer pieces the grain runs horizontally. A third piece of oak, 20mm (¾in) thick, its grain running vertically, is fastened to the front pieces by 24 round-headed nails set diagonally. The inner trapezoid is slightly

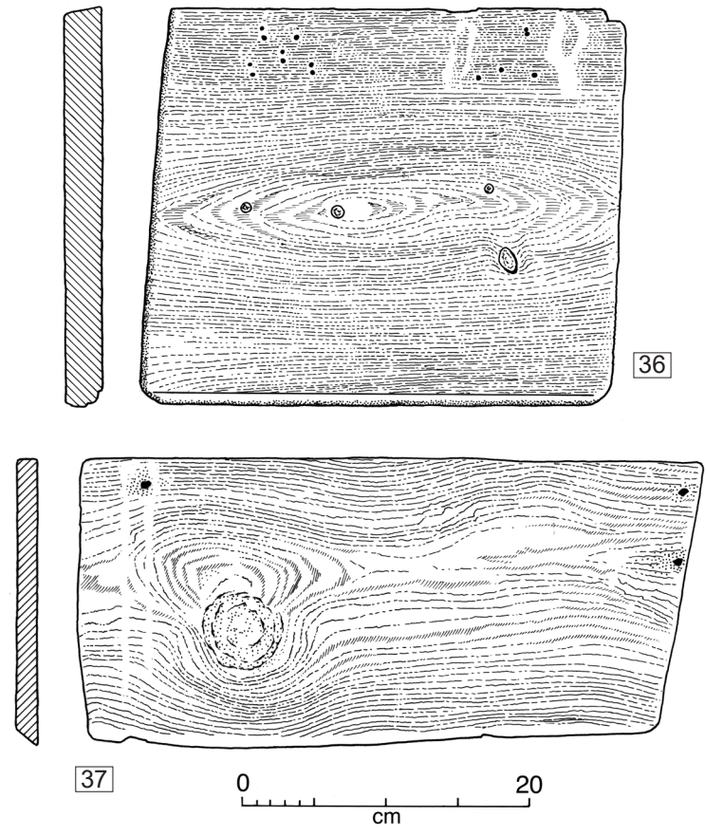

Illustration 156
Two trapezoidal pieces of wood 36–7 with traces of fixings, probably locker lids

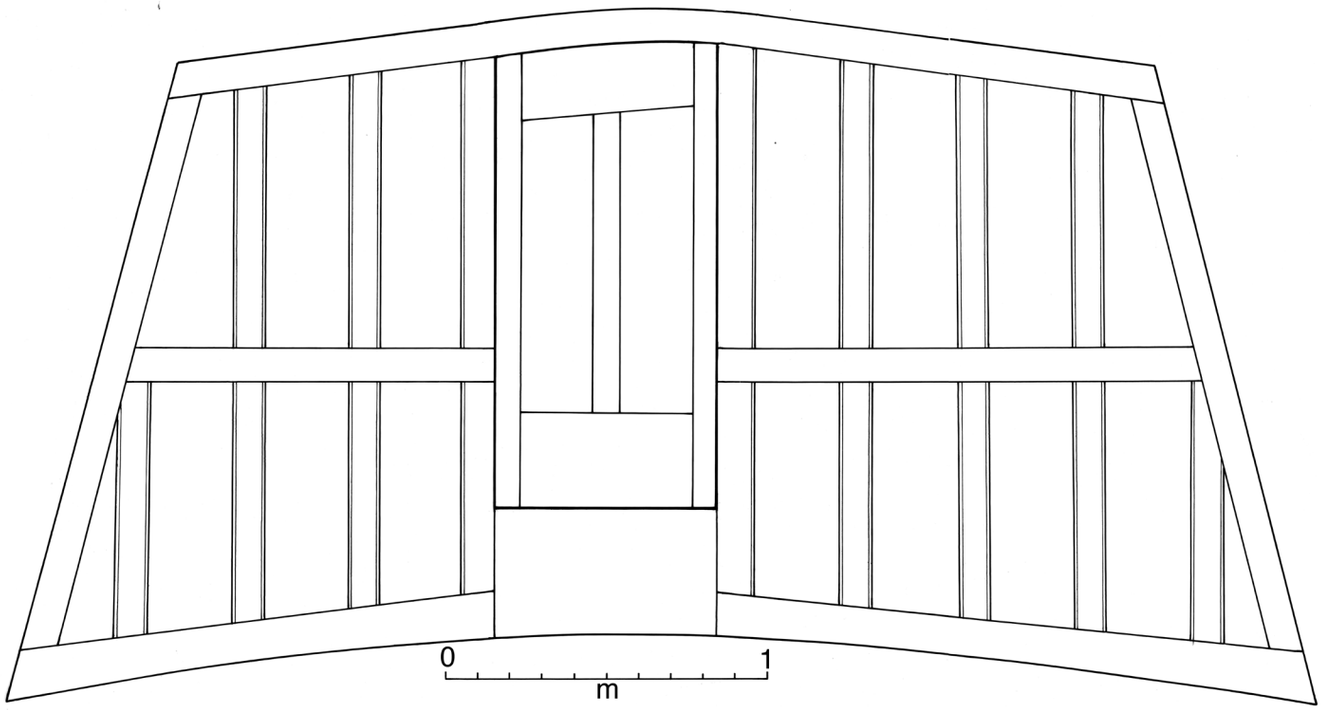

Illustration 157
Speculative reconstruction of the great cabin bulkhead, based on various finds

smaller than the outer, creating a lip of variable width, ranging from 20mm (¾in) at the lower right to nil along most of the left edge. Two wrought-iron straps with hinge-rings at the top, the form of which has been reconstructed in the drawing from their concreted remains, are secured to the outside of the lid.

This method of construction is similar to that of the gun-port lids of the near-contemporary *Vasa* (personal examination) and those of the century-earlier *Mary Rose* (Hildred 1997: 51–2), though on a much smaller scale. The Duart Point lid is designed to cover a 1ft (300mm) port, slightly trapezoidal in shape, which is far too small to accommodate a mounted piece of ordnance. The only likely alternative is an oar-port lid, and of the three ships wrecked off Duart Point only *Swan* is recorded as being equipped with oars (see Chapter 2.2). Square oar-ports of comparable size are depicted in the design for an English frigate of *c* 1625 (Howard 1979: 150) and

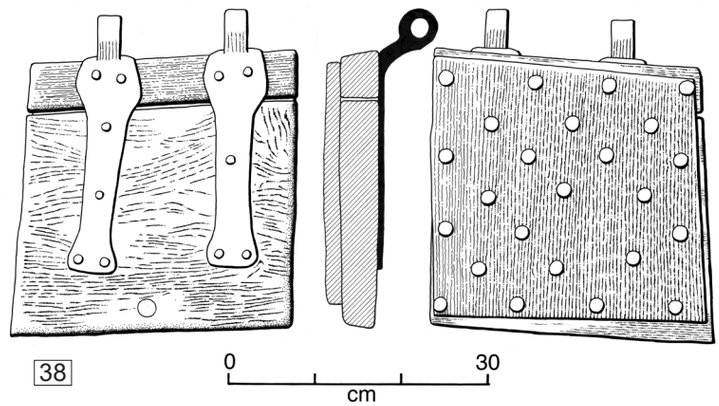

Illustration 158
The oar-port lid 38

are also evident on several contemporary ship-models (eg National Maritime Museum SLR0367, Gardiner 2012: 8–9). The disposition of guns as reconstructed from their present locations on the wreck (see below) suggests that the main deck between the main- and fore-masts was kept free of ordnance to accommodate the rowing-banks.

5.6 Rig and internal arrangements

Within the general parameters set by the reconstructed hull's form and dimensions, other elements derived from archaeological evidence and its analysis can be added (Illus 159). The identification of the fragmentary transverse mainmast-step (reconstructed in Illus 160), confirmed by the adjacent pump-sumps, is 9.5m (31ft) beyond the aft end of the keel, just forward of the mid position. This indicates a full three-masted rig, and the suggested positions of mizzenmast, foremast, and bowsprit, and their angles of set, follow Lavery's arguments in his reconstruction of *Susan Constant* (1988: 11, 58–9). Logic dictates that the mizzenmast was stepped on the upper deck, as it is on *Vasa* (Cederlund 2006, longitudinal section of hull in end pocket) and as Lavery (1988: 58) prescribes for *Susan Constant*.

On the upper deck, aft of the mizzenmast, there is room for a stern cabin extending some 2.75m (9ft) fore-and-aft, with some additional cupboard space and sanitary facilities provided by the quarter-galleries indicated by the stepped frame from a quarter-gallery roof 12 (Simmons 1997: 36). The presence of the mizzenmast immediately forward of the great cabin may explain the offset door in the cabin's forward bulkhead. On either side and forward of the mizzenmast, the space could have been used for subordinate officers' cabins as well as to provide access to the great cabin. Forward of that, facing an opening in the sterncastle's forward bulkhead, the steersman would have had a clear view ahead and aloft. This position is the logical place for the whipstaff and, just forward of it, the binnacle (Harland 2010).

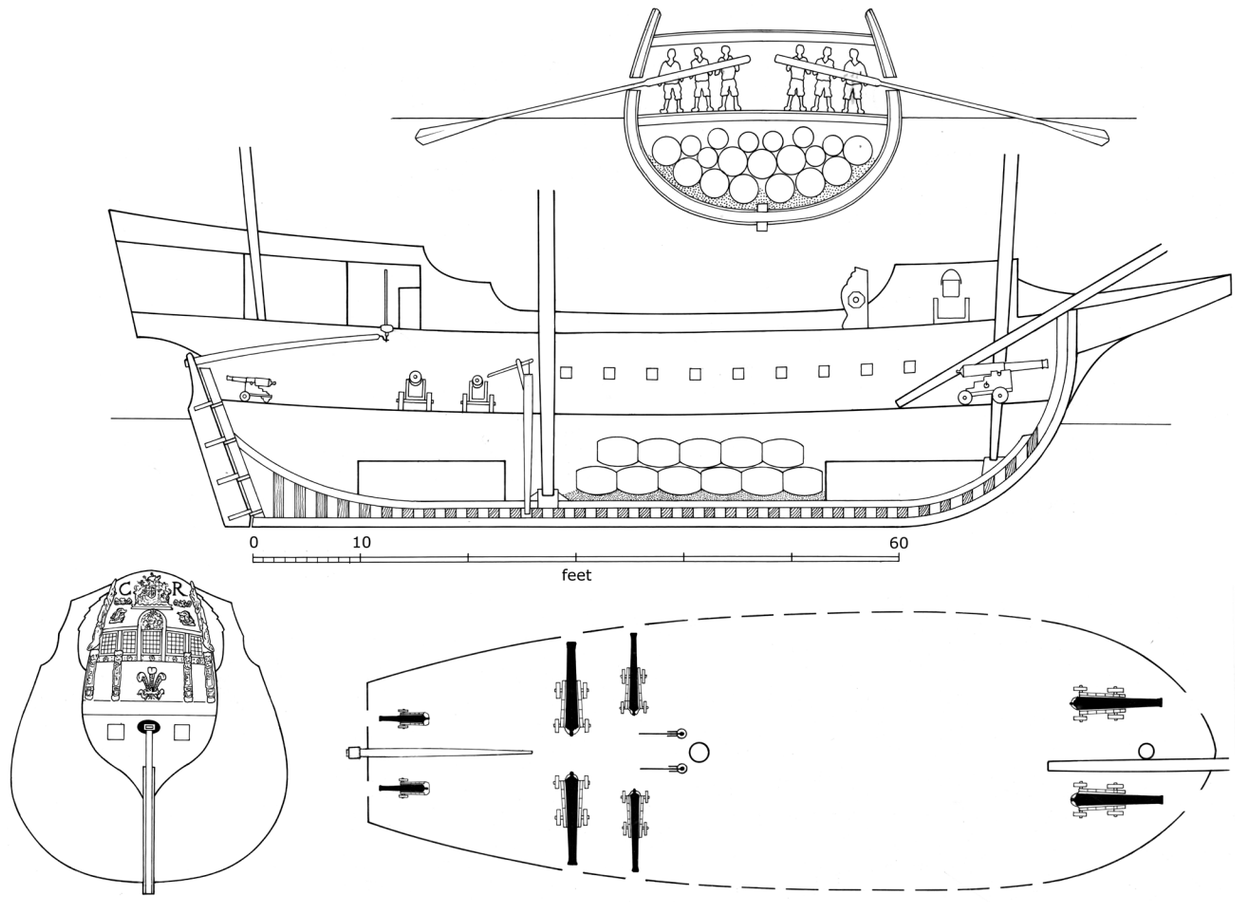

Illustration 159
Speculative reconstruction of the layout of the ship (DP 151192)

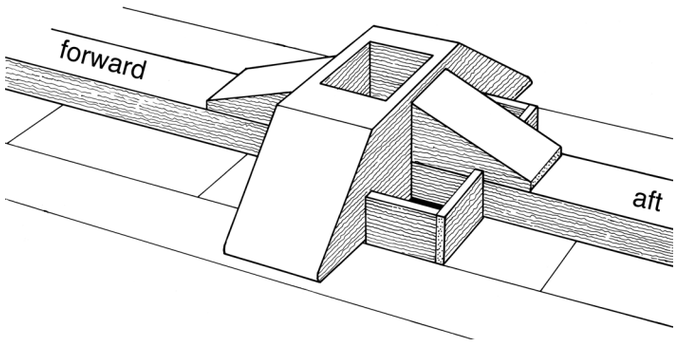

Illustration 160
Reconstruction of the transverse mainmast-step over-riding the keelson. Chocks on top of the keelson reinforced it longitudinally. The boxed features aft are the pump-sumps. On either side of the keelson are short, removable limber-boards (DP 151189)

On the main deck below, the after part would be occupied by the gunroom, accommodating the sweep of the tiller at its upper level and providing space for accommodation and stores beneath. This would be a suitable place for the lightly partitioned cabins of junior officers. The disposition of guns on this deck is significant. As argued in Chapter 4, the ship appears to have collapsed in situ, and heavy items such as guns are unlikely to have moved from where they first fell. Their relative positions on the sea-floor therefore probably reflect their original disposition within the ship (Illus 159).

Nine rowing-banks are hypothesised for each side of the reconstruction, with three men allocated to each sweep (the figure quoted for the *Lion's Whelps*, see Chapter 11). Four men per sweep are shown in the cross-section of a large warship of *c* 1625, bearing Charles I's monogram (plan in the National Maritime Museum, reproduced in Howard 1979: 150). This vessel had a keel-length of 29m (96ft), a beam of 9.75m (32ft), and a burden of 368 tons. The plan also indicates a gap of 1.2m (4ft) between the oar-ports, and this figure has been adopted for the Duart Point reconstruction. Since the inboard oarsmen would have had to travel a considerably greater distance than the outboard ones on each stroke, rowing-benches would not have been practicable, so a standing position for the oarsmen is postulated. The *Whelps*' oars were 9.75m (32ft) long, and this figure is adopted for the reconstruction. When stowed, the oars could have been hung from the upper deck-beams.

Aft of the forecastle, on the upper deck, the ship's main motive machinery for heavy lifting and managing the sails and anchors may be presumed. A capstan would be impracticable, since unless located towards the centre of the waist, where it would have obstructed the main working area of the upper deck and stowage for a ship's boat, there would have been insufficient room to rotate the bars. For a small vessel such as this a windlass, mounted well forwards, is a more likely alternative. When hauling the anchor from this point the cable could drop vertically through hatches in the upper and main decks, to be faked onto a cable-tier of loose boards or possibly a light planked structure lying above the forward ballast (for which, it should be noted, no surviving evidence was recorded). A coiled anchor-cable lay in this position on the wreck of *La Belle* (1686) (Bruseth & Turner 2005: 55), while a forward windlass was recorded on the Stinesminde wreck in North Jutland of *c* 1600 (Gøthche 1994: 183–5).

Between the forward ballast-mound and the mainmast/pump-sump complex, in the broadest part of the lower hull, is space for a 7m × 7m × 3m (24ft × 24ft × 10ft) hold with a stowage capacity, allowing for the curvature of the hull, of 300m^3 (5,430ft^3). The aft ballast-mound was doubtless also covered by light decking, and while the arrangements in this part of the ship can only be speculative, this area of the lower stern was traditionally a location for the bread-room (Smith 1691: 12), while a concentration of fish bones at the after end of the lower hull suggests that the freshly caught consignments of ling were stored here. For reasons of trim, roundshot was normally stored near the middle of the ship, and boarded shot-lockers might conveniently have been positioned on either side of the pump-well. The absence of shot in this area, and its general paucity across the wreck as a whole, may suggest that most of the ship's munitions had been taken ashore.

The pumping arrangements are described in Chapter 6.3. The absence of decomposed food remains and domestic sewage in the interstices between the frames is significant. A ship's 'tightness' or resistance to leaking was gauged, as a contemporary source observes,

> by the very smell of the water that is pumped out of her, for when it stinketh much, it is a sign that the water hath lain long in the hold of the ship; and, on the contrary, when it is clear and sweet, it is a token that it comes in freshly from the sea. This stinking water therefore is a welcome perfume to an old seaman; and he that stops his nose at it is laughed at' (Perrin 1929: 239).

The sweet-smelling Duart Point ship, it may be supposed, was a leaky vessel.

Within the forecastle and on the main deck a brick-built galley fire can be inferred from the debris of bricks, tiles, and food-processing equipment, including the ship's 11-gallon hanging kettle [61]. The back and sides of the fire-box would have been clad with tiles to create a fire-proof screen. Among other equipment stowed in this area was a rotary quern or hand-mill [62], which would have been used for grinding grain foraged ashore. The galley structure was perhaps located towards one side of the forecastle so as to be clear of the foremast and bowsprit, and the spread of collapsed debris suggests that it had been situated on the port side.