that the site was an arena for specialized industrial activities (Armit & Dunwell 1992, esp 147). Although the 'furnace-like structure' from A' Cheardach Bheag cannot be related to a specific industrial process it may be associated with ironworking (Fairhurst 1971, 90). Finally, the crucibles from the furnace at Bac Mhic Connain show that the structure was used for non-ferrous metalworking at some stage (Beveridge & Callander 1932, 43, 48, fig 2). Although the slag cannot be directly related to the furnace it too is part of a wider, probably specialized, on-site metalworking tradition. These examples suggest that different sites were home to different degrees of metalworking. Whether they relate to different parts of the ironworking cycle (smelting, primary smithing, secondary smithing) or form part of a wider network are difficult to answer at present. However, they do suggest that not all slag can be explained as object repair. If this is true of the Hebrides it is likely to be true of the rest of Iron Age Scotland.

Although the metalworking debris from Cnip is small in quantity and from secondary contexts it is a useful collection for stimulating pertinent questions regarding the scale, role and organization of ferrous metalworking in Atlantic Scotland. The ever-increasing Hebridean corpus has an important role to play in these discussions. As Armit and Dunwell (1992, 147) state, the possibility of well-preserved specialist workshops of Iron Age date surviving in their wider landscape gives these sites an importance in a far wider context than Atlantic Scotland.

3.12 NON-FERROUS METALWORKING DEBRIS

Andrew Heald and Fraser Hunter

3.12.1 MOULDS

Six objects from Cnip were associated with non-ferrous metalworking. All are valves of bipartite moulds (for the general process see Curle 1982, 35–9 and Lane & Campbell 2000, 201–3). None of the moulds are complete, nor do they preserve the full extent of the object manufactured. However, where discernible, all appear to be associated with the manufacture of pins. They are made from a fine brown oxidized clay with few inclusions, reduced to grey at the casting face. Three of the moulds are upper valves, the others lower valves. Rather than having keys to hold the halves together, the face of each upper valve is dished on either side of the object impression to act as keying for the corresponding convex area on the lower valve. Four of the moulds have surviving in-gates, where the metal was poured into the mould. These are always at the bottom of the pin shaft. All moulds have remnants of a skin of clay that was applied to the exterior to hold the two halves of the mould together. These technological aspects are used consistently by the Cnip smiths. The casting surfaces were analysed non-destructively using energy dispersive X-ray fluorescence (EDXRF) by the Conservation and Analytical Department at NMS.

SF270 (Ill 3.27a)

Ring-headed pin mould. Upper valve with ingate. Broken at the head. The shaft of the pin (width *c* 3mm) is defined by two prominent ridges. Sadly the broken area contained the crucial details for identifying the pin type. It is a projecting ring-headed pin, with the plane of the head 4.5mm in front of the shank. The face is lost, but the edge is preserved up to about half the head's original height and is plain, indicating it was not a beaded or rosette-headed pin. It could be either a plain ring-headed pin or a proto-handpin, where the crescent in the lower half is plain (Stevenson 1955, 289, fig B, nos 2, 12): it is not possible on this evidence to discriminate between them. Extrapolating the full extent of the head gives a pin of L some 75mm, with a head of W 19mm and H 20mm, and a shank of L 55mm and D 2.5–2.7mm. EDXRF analysis revealed highly enhanced values of zinc and lead, and traces of copper. L 83mm, W 33.5mm, T 20mm. Context 172, Block 5b, Phase 2b (sand deposit in Bay 1, Wheel-house 1).

SF271 (Ill 3.27b)

Pin mould. Upper valve fragment with ingate. Broken at one end. Only the shaft survives. The shaft of the pin is defined by two prominent ridges which are very irregular and bowed in places (width *c* 2–4mm). Probably associated with SF272. EDXRF analysis revealed traces of zinc and copper. L 48mm, W 27mm, T 18mm. Context 181, Block 5b, Phase 2b (sand deposit in Bay 7, Wheelhouse 1).

SF272 (Ill 3.27c)

Pin mould. Lower valve fragment with ingate. Broken at one end. Only the shaft of the pin survives (width 3mm). Probably associated with SF 271. EDXRF analysis revealed no significant metal traces. L 46mm, W 21mm, T 15mm. Context 181, Block 5b, Phase 2b (sand deposit in Bay 7, Wheelhouse 1).

SF212A (Ill 3.27d)
Pin mould. Upper valve fragment with ingate. Broken at one end. Only the irregular shaft of the pin survives (width *c* 2–3mm). Probably associated with SF212b. EDXRF analysis revealed no significant metal traces. L 44mm, W 28mm, T 18mm. Unstratified.

SF212B (Ill 3.27e)
?Pin mould. Lower valve fragment. None of the original casting surface survives. However, the object has the fabric characteristics of a mould and as it was found associated with SF212a it is likely to be part of a mould. L 27mm, W 16mm, T 17mm. Unstratified.

SF 273 (Ill 3.27f)
Pin mould. Lower valve fragment. Broken at both ends. Remnants of a pin shaft width *c* 3mm. The part of the mould with the pin head does not survive. EDXRF analysis revealed no significant metal traces. L 43mm, W 25mm, T 18mm. Context 173, Block 5b, Phase 2b (sand deposit in Bay 2, Wheelhouse 1).

3.12.1.1 Other
Four other fragments (SF274–277) from the site may also be moulds. However not enough survives to be sure of function or product. EDXRF analysis revealed no significant metal traces. L 24mm, W 22m, T 16mm. L 26mm, W 17m, T 15mm. L 21mm, W 16m, T 13mm. L 26mm, W 18m, T 10mm. Context 289, Block 5a, Phase 2a (deposit of peat ash in Bay 7, Wheelhouse 1) (see Section 2.4.1.5).

3.12.2 DISCUSSION

While only one valve (SF270 (Ill 3.27a)) has evidence for a pin-head, all of the diagnostic moulds are for the manufacture of pins. Although it is difficult to relate the upper and lower valves some appear to be part of the same two-piece mould (see Section 3.12.1). This suggests that at least four pins were made by the Cnip smiths. Only the largest surviving fragment allows a closer identification. As noted, the pin was either a projecting ring-headed pin or a proto-handpin. The former were in use throughout the Iron Age (see Stevenson 1955) and an example from Scalloway, Shetland suggests the type survived in use into the fifth century AD although not necessarily in manufacture (Sharples 1998, 185). Proto-handpins normally date to around the third-fourth century AD (Youngs 1989, 23). The context from which the mould derives suggests that the mould may be for the manufacture of a projecting ring-headed pin – it is from one of the latest deposits in Phase 2, which is dated to around AD 100 (see Section 6.3.3). Ring-headed pins are found across Scotland (Stevenson 1955, 288–92; Clarke 1971, 49–54), although manufacturing evidence is

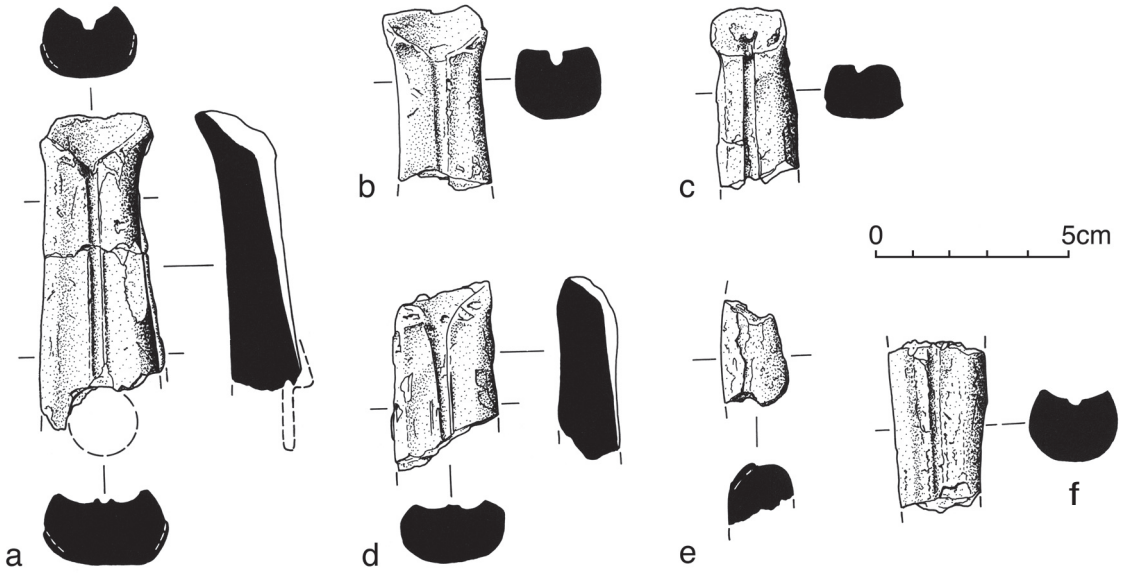

ILLUSTRATION 3.27
Moulds, (a) SF270, (b) SF271, (c) SF272, (d) SF212a, (e) SF212b, (f) SF273.

rarer. Moulds for various types are known from a variety of sites including Sollas, North Uist (Campbell 1991, 164), Gurness, Orkney (Hedges 1987b, 158–9, figs 2.84–5; Close-Brooks 1987), Lingro, Orkney (Stevenson 1955, 290), and Traprain Law, East Lothian (Burley 1956, 219–20; Stevenson 1955, 290). Given the type's wide distribution, this concentration of manufacturing debris in the Atlantic area is more to do with the survival of artefact-rich deposits than a real cultural phenomenon.

Although the interpretation of EDXRF spectra of moulds is problematic (see Barnes 1983; Dungworth 2000) the high zinc reading may be noteworthy. While the original alloy is uncertain the analysis suggests that the ultimate source of the metal was from a supply drawing on Roman sources, as zinc is unknown in any quantity in Iron Age alloys (Dungworth 1996, 403). This may also have chronological significance: the presence of zinc suggests that the mould does not predate *c* AD 80. This seems to fit well with the radiocarbon dates from Cnip (see Section 6.3.3).

All stratified mould fragments are associated with the occupation and infill of the Wheelhouse Structure 1 (Phase 1–2, Block 5). The moulds were found during the excavation of three different bays (1, 2, 7). All of these bays saw various periods of use making the recognition of in situ metalworking areas and episodes difficult. That said, the moulds do indicate that non-ferrous metalworking took place at Cnip around the turn of the first millennium and is a welcome addition to our scant knowledge of non-ferrous metalworking in the area.

As with ironworking (see Section 3.11) our understanding of the scale and organization of non-ferrous metalworking across Atlantic Scotland during the Middle Iron Age is limited. Implicit within many discussions of non-ferrous metalworking throughout the first millennium BC/AD is the association between the craft and sites of high status and/or central places. At one level this seems a perfectly reasonable argument, as the quantity of moulds and crucibles from important Early Historic sites, such as Dunadd, Argyll illustrates (Lane & Campbell 2000, 106–47). Analysis of the evidence for non-ferrous metalworking in Atlantic Scotland during the Middle Iron Age suggests that sites argued to have some wider importance within the community – for example Orcadian nucleated settlements – were foci for the craft (Heald 2005). In this light the non-ferrous metalworking evidence from Cnip could easily be viewed as part of the goods and expertise circulating during the Middle Iron Age.

At present, it is difficult to interpret the role and organization of non-ferrous metalworking in the Western Isles. Moulds and crucibles have been recovered from around 18 sites of probable Iron Age date. These include the wheelhouse complexes at Bac Mhic Connain (Beveridge & Callander 1932, 49, 61–2, fig 17); Garry Iochdrach (ibid, 42); Sollas (Campbell 1991, 163–4, Illus 22); Cnoc a' Comhdhalach (Beveridge 1911, 200–6; Campbell & Heald forthcoming); and Clettraval (Scott 1948, 67–8) (all North Uist); A' Cheardach Mhor, South Uist (Young & Richardson 1960, 155–6, fig 13); and Tigh Talhamanta (Young 1953, 100–1, fig 9); and Alt Chrisal, Barra (Gowans 2000, 189). On the one hand this appears to suggest that non-ferrous metalworking was actually a common activity. However, many of these sites were reused after the primary occupation, and the metalworking debris may be much later. This is demonstrated by the recovery of a mould for the manufacture of an eighth-century penannular brooch from Cnoc a' Comhdhalach (Campbell & Heald forthcoming).

While not disputing the social importance of the craft, research into the Later Iron Age metalworking tradition offers a word of caution. This shows that non-ferrous metalworking, often including the use of precious metals and the manufacture of ornate objects, took place on a wider range of sites than hitherto appreciated, including sites argued to be at the lower end of the social spectrum. It is, therefore, an oversimplification always to equate non-ferrous metalworking with sites of high status or central places (Heald 2005; Campbell & Heald forthcoming). The Scottish Iron Age is typified by regional variation in structures and artefacts, which presumably reflect varying social and economic trajectories in different areas at different times. Thus, we cannot automatically assume that the non-ferrous metalworking evidence from Cnip attests to high status or specialist occupants. At present the Hebridean Middle Iron Age dataset is unable to reveal whether the craft was a high-status activity, an occasional and rare activity carried out by itinerant specialists or a commonplace and habitual one carried out by the community. That said, the deliberate burial in a pit of a complete crucible containing mica plates from Sollas (Campbell 1991, 144) and the relative rarity of copper alloy ornaments compared to bone ones strongly suggests that metalworking and metal items were viewed as items of some importance in the Hebridean Middle Iron Age. Perhaps the smith was viewed in equally high regard.