# The Glenhead Axehead Mould

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*This early Bronze Age mould was used around 2000BC when the transformation of stone ores into shaped metals was considered mysterious and the itinerant metal workers were regarded as magicians by most of the population. Bronze alloy had just been introduced as superior to copper.*

Introductory Film : The Glenhead Axehead Mould

In June 1997 a fine example of an Early Bronze Age stone mould was found by David Petch at his farm at Glenhead, Carron Bridge, near Denny (NS 757 850), where it had apparently been grubbed up by his pigs. In view of its archaeological significance, the mould was claimed as Treasure trove and was allocated to Falkirk Museum Service (Acc. No. 1998-37-1).

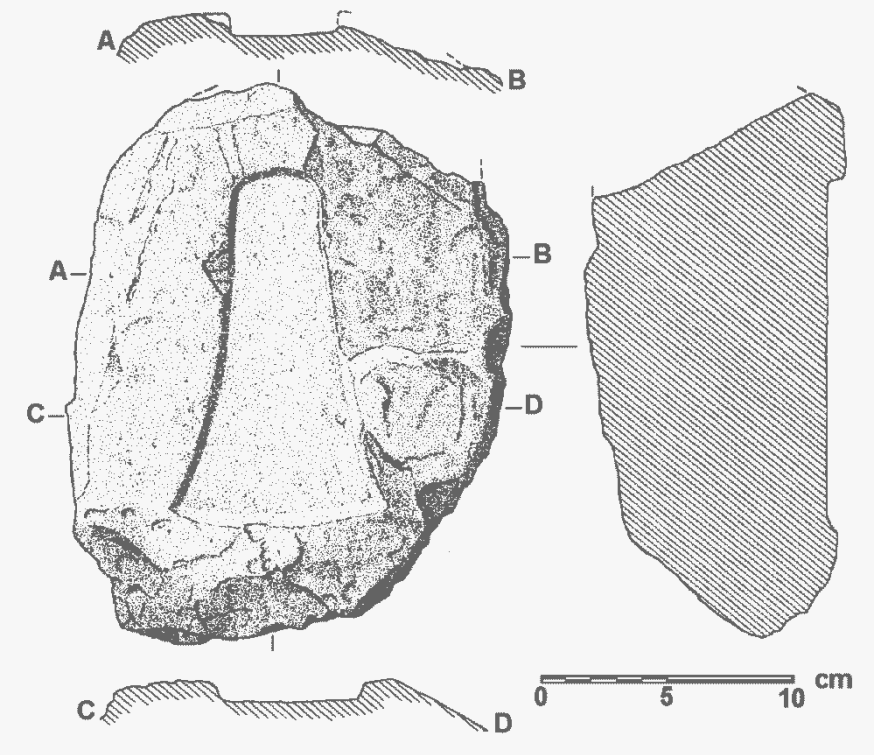
***Illus 1:***
**The Glenhead axe mould.**

The find-spot lies on the eastern edge of the farm buildings at Glenhead. Mr Petch explained that the pigs had been turned loose in this area in order to break up the rank growth of weeds. This done, he had started to remove the loose stones and rubble littering the area and it was simply by chance that the shaped surface of the mould caught his eye. The circumstances suggest that the mould had almost certainly been redeposited and we can therefore only guess at its original context. The relatively fresh condition of the object may mean that it has been found locally and kept as a curiosity and subsequently discarded at some point in the occupation of Glenhead itself. The present farm certainly dates from at least the mid-18$^{th}$ century, while a fragment of a marriage stone in the steading suggests that there may have been a farm here by the late 17$^{th}$ century (G Bailey *pers comm*). On the other hand, it is clear that this edge of the steading occupies made-up ground, and one possibility is that the mould has formed part of a load of rubble brought in during construction work. Material of this quality is unlikely to have been transported far and may simply have been won from the immediate surroundings. However, it is also known that a lot of building stone was

brought from nearby Nicolswalls Farm for use in connection with an extension to the byre at Glenhead (G Bailey *pers comm*). While the original context and circumstances of deposition are therefore unknown, there seems no real reason to doubt a relatively local provenance.

The object consists of a rather irregular sub-rectangular block of sandstone whose flat upper surface contains a single matrix designed for the casting of copper alloy axeheads. The parent block has been fashioned from a small weathered boulder; at least some of the faces appear to have been roughly dressed to reduce its bulk. The stone has a small number of clearly fresh scuff marks and scratches, but given the find circumstances, there is remarkably little damage that is obviously modern. Differential coloration and weathering suggest that the block has incurred damage on at least two separate occasions in the past. At some stage, one end of the block has sheared off completely (see longitudinal cross-section): this level of damage could be accounted for if the block of stone was accidentally incorporated into the rubble make-up of the farm steading, as suggested above. However, the condition of the stone suggests that the upper surface has also been damaged at an earlier stage in the history of the object. On the face bearing the matrix, the loss of a large spall of stone has reduced the depth of the matrix to about 2mm (see cross-section A-B), and while the outline of the matrix is still clearly visible, this would not have been viable for casting. Admittedly, it is possible that this spall was detached at a much later date, but if the damage to this surface was incurred at the time of the manufacture of the mould, this could possibly have resulted in its premature discard or deposition. The overall dimensions of the parent block are 220 by 175mm, with the thickness varying from 95-105mm. It weighs 4.143kg.

The actual mould comprises a single matrix for a flat axehead. At the surface, the dimensions of the matrix are as follows: length 142mm; width (cutting edge) 91mm and width (butt) 34mm. At the base of the matrix, the length is 135mm; width (cutting edge) 81-82mm and width (butt) 32mm. The depth of the matrix varies from 6.5-8.5mm, but this reduces to only 2mm at the point where a flake of the original surface has been detached. As noted above, this damage may have rendered the matrix unserviceable; if so, this would be in keeping with the texture of the base of the matrix, which seems to be relatively freshly pecked, and the apparent absence of any obvious effects of heat.




***Illus 2:*** **Face and sections of the axe mould (Alan Braby).**

Analysis of the mould was undertaken to ascertain whether there were any residual traces of metalworking. Energy dispersive X-ray fluorescence (XRF) was used without any sample preparation and the centre and side of the matrix were analysed. The main element detected in all areas was iron, with strontium, zirconium, potassium, calcium, titanium and manganese detected at lower levels. These elements are attributed to the stone of the mould and all areas had very similar compositions. No elements characteristic of copper alloys were detected. Although traces of non-ferrous elements (copper, lead, tin and zinc) were detected in a study of Early Bronze Age to Viking Age moulds (Barnes nd, 41), it has been noted that such analysis of moulds to determine the metal cast is rarely successful (Bayley 1987, 201) due to the relatively low temperatures and short times for which the metal and mould are in contact; this results in physical rather than chemical attachment of metal to the mould, which rarely survives burial and excavation. Hence the absence of metallic traces in the stone mould analysed does not necessarily rule out its use (this paragraph contributed by Dr Katherine Eremin).

The find is of considerable interest in that it represents the first Early Bronze Age mould to be found in central Scotland. Out of the fourteen stone moulds from Scotland considered to be for the production of metal artefacts of the period, only two other definite examples have been found south of the Grampians. One was found in the Jedburgh area of the Borders (possibly found on the Dunion or Rubers Law: Cowie in prep)

while the other was discovered at Easter Cluny Farm, near Newburgh, Fife (M King *pers comm*). Sherriff (1997) published details of a possible axe mould found at Ledmore, near Brechin, Angus. However, the much larger size of the parent block and the atypical form of the supposed matrices set the Ledmore find apart from all the other known examples, and the present writer remains unconvinced about its interpretation.

Like the example from Glenhead Farm, most of the Early Bronze Age moulds consist of blocks of sandstone which have been shaped to facilitate handling and to provide flat surfaces for the preparation of the matrices. These were usually cut into the main surfaces but sometimes extend onto the sides, as on an example from Foudland, near Insch, in Aberdeenshire, which has no less than nine matrices, not all of which appear to have been used (Britton 1963, 321-2; Schmidt & Burgess 1981, 53 No. 296). The range of objects cast in such moulds included axes of several sizes, knives, armlets, awls and bars (which appear to have been the starting point for other objects). Some of the smaller matrices may have been used to cast slabs of metal for hammering into sheet bronze. Although usually referred to as 'open moulds', it is likely that a stone or wooden cover was used during the actual casting operation to prevent oxidation of the metal. Once removed from the mould, the castings would have required considerable subsequent work. In order to produce finished axe-heads, for example, the plano-convex cross-section of the rough casting would usually have had to be made more symmetrical, and the cutting edge would have required careful working to give it a deeper curve. Finally, the whole surface would have been polished to give a shiny golden-brown surface, belied by the surviving condition of most bronze axes.

However, as noted above, it is possible that the Glenhead mould was in fact never used. The apparently freshly pecked condition of the base of the matrix tends to suggest that the mould may never have been invested with metal, the damage to the edge of the matrix possibly having been the immediate cause for its discard or deposition. These observations would be in keeping with the analytical results, which revealed no metallic traces, although as Dr Eremin stresses, their absence is not conclusive. Stone moulds were probably pre-heated to reduce thermal shock and prolong working life (Barnes nd, 42): if, say, the matrix on the Glenhead mould was rendered unserviceable by damage at this stage, this would provide one possible explanation for the discard of an otherwise near-complete though unused matrix.

The distinctive shape of the matrix on the example under discussion shows that flat axeheads cast from this mould would have belonged to the general series known as the 'Migdale' type, named after a well-known hoard found near Bonar Bridge in Sutherland (Coles 1969, 108-9; Schmidt & Burgess 1981, 35-6). Typically, these are bronze axeheads

with a narrow butt from which the sides diverge to meet a splayed cutting edge – all features readily apparent on the Glenhead mould. An axehead cast in this mould would have been comparable in size and proportions to the type specimen from Migdale itself (ibid, 42 no.157) or to examples from Barevan Kirk, Cawdor (ibid, 43 no. 169) or Inchnadamph, Sutherland (ibid, 43 no. 170). The mould thus belongs to the stage of the Early Bronze Age which saw the introduction of tin as an alloy of copper to make bronze, a transition now firmly dateable to the period from c2300-1900 CAL BC (Needham 1996, 130). Although Migdale type bronze axeheads have a widespread Scottish distribution, no recorded examples are known from Stirlingshire (cf Schmidt & Burgess 1981, pl. 115) so that the mould in fact represents the first evidence for their production and probable circulation in the immediate region.

No definite prehistoric mining sites are currently known from Scotland; however, metal analyses suggest that that ores from Scotland may have begun to be exploited during the Early bronze Age (Northover *pers comm*). In view of their relative proximity, the historically documented copper-workings at Corrie, NW of Kilsyth (Stat Acct, vol xviii (1976), 234-5), and in the Ochils (Franes et al 1970, 292-3) are thus clearly of potential significance, while barytes veins associated with lead and copper ores have been recorded even nearer at Burnside and Northfield Quarry (ibid, 292). One factor, which has a bearing on the detection of early mining sites, is that modern records of mineral resources tend to be limited to those with a high enough concentration of metalliferous mineral to be exploitable commercially. Prehistoric communities, on the other hand, may have utilised much smaller deposits, on a scale which would be considered uneconomic today (cf Briggs 1976, 273-8). Moreover, where mineral deposits have subsequently been exploited, the later workings may have destroyed or masked the traces of any earlier mining activity. While it is possible that the actual ore could have been transported (Scott 1951, 39), it is more likely that the metal would have been smelted at or near the source and transported in the form of ingots. Only a few examples of what are thought to be Early Bronze Age ingots are known from Scotland, but their rarity is unsurprising, for in view of their function, such artefacts are bound to be under-represented in the archaeological record.

This article is an abbreviated form of that found in Calatria Volume 14, 97-108, entitled 'An Early Bronze Age stone mould for casting flat axeheads'.

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