

EVIDENCE OF ANCIENT COPPER MINING AT ENGINE VEIN, ALDERLEY EDGE, CHESHIRE

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Abstract: An elevation drawing of a copper mining face is presented and the role of grooved stone hammers at Engine Vein, Alderley Edge, Cheshire, is discussed. Three main periods of mining activity have been identified; a pitting technique, late 17th/early 18th century underhand stoping and late 19th century blasting.

The evidence for prehistoric mining is reviewed and the occurrence and dating problems of the Alderley Edge type of grooved stone hammers are discussed. On the basis of parallels with sites in Ireland, Wales, Sinai, the Balkans and Anatolia, a Bronze Age date is suggested for the Engine Vein pits.

INTRODUCTION

The mining area of Alderley Edge lies in Cheshire, 20 km south of Manchester. The Edge, an escarpment lying east of Alderley, rises 120 metres above the drift-covered plain. The copper mines have been described by Warrington (1965; 1981) and Carlon (1979). Amongst the mines the Engine Vein is clearly an early open cut.

Along the north side and length of the openworks there can be seen the remains of five separate pits which have been subsequently intersected by later mining. The pit surfaces are smooth and rounded and the distinctive peck marks of stone hammers are preserved. To record and contrast these techniques of extraction the author selected the area incorporating two pits at the east end of the north side to be drawn. This section is the largest exposure in the openworks. The elevation drawing covers an area 14m x 6m (Fig.1).

GEOLOGY AND MINERALISATION

The Alderley area is on the north-east part of the Permo-Triassic Basin. The Engine Vein openworks consists of the Lower Keuper Sandstone (Engine Vein Conglomerates), one of the main levels of mineral impregnation. The copper ore disseminations are richest immediately above the clay bands, particularly along faults.

The pits and openworks have been excavated along the Engine Vein Fault exploiting the richly mineralised brecciated rocks between two parallel faults. The principal ores are those of copper and lead. The principal copper ore at Engine Vein is malachite coating sand grains and pebbles, and concentrated around clay pellets. Azurite is moderately abundant in the wall-rock immediately adjacent to the fault (Warrington 1965 p117). Copper sulphides are rare.

BACKGROUND

Alderley Edge earned its reputation as a 'prehistoric' mining site from a spate of antiquarian activity in the late 19th and early 20th centuries. During a visit to the Brindlow Levels in May 1874, then worked by the Alderley Edge Mining Company, William Boyd Dawkins noticed in the recent surface exposures hollows containing grooved stone hammers (Dawkins 1875 p2). Later that year he returned with General Pitt-Rivers to excavate these ancient workings. He was able to examine over 100 of the hammers which he divided into three types:-

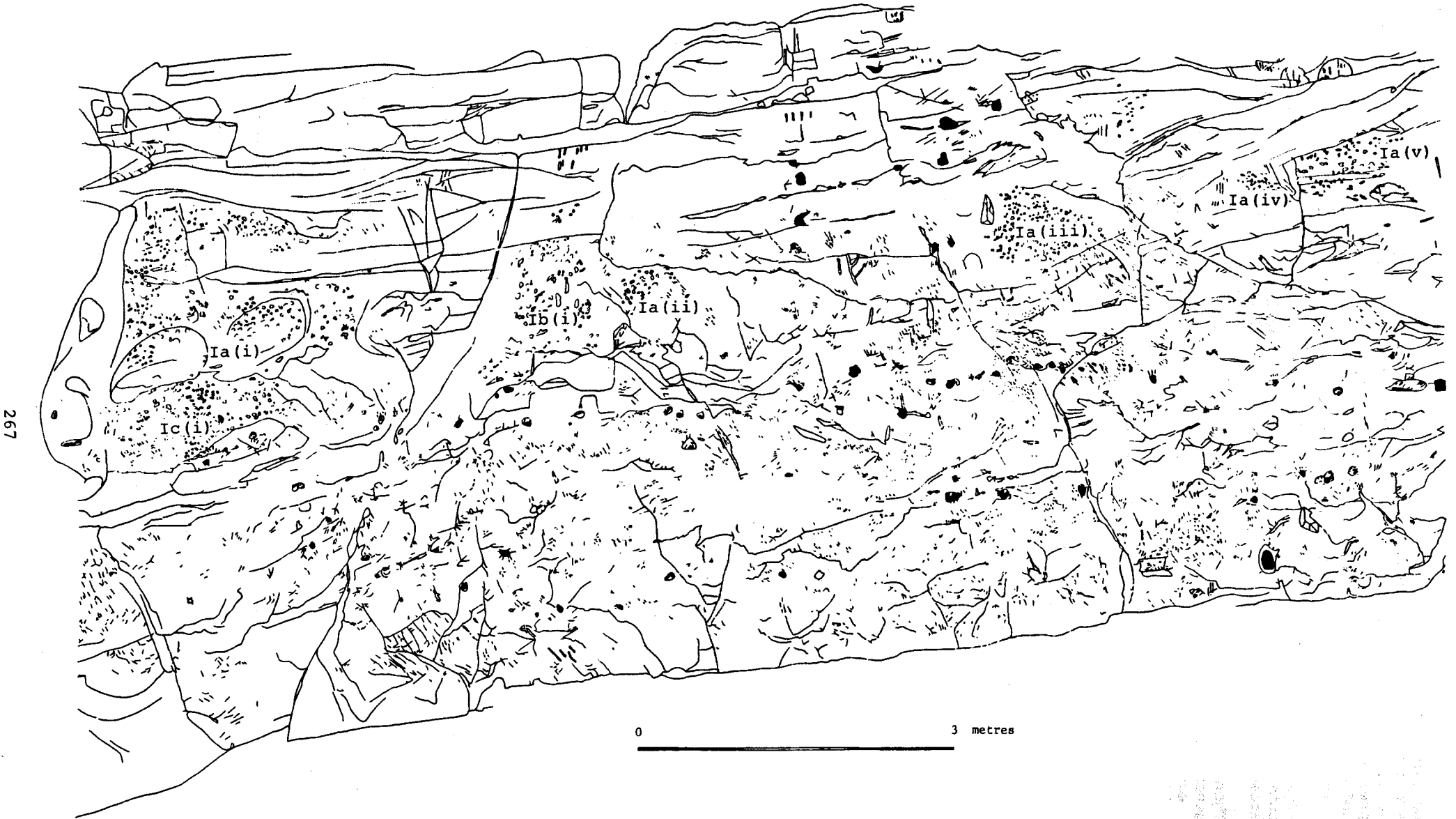
- 1) Hammers with a transverse groove
- 2) As type (1) with a lateral groove
- 3) Wedges with a flat head and groove.

He compared these with stone hammers found at the ancient copper mines of Anglesey, Spain, Portugal and Lake Superior.

Dr. Sainter subsequently examined the Brindlow site (Sainter 1878 p47f). In addition to the stone hammers found in pits from three to four yards deep, he found an oak shovel that had been very roughly used (1878 Fig.3 facing p65). Like Dawkins he suggested that these foreign pebbles had been picked up from the glacial drift which covers most of the Cheshire Plain.

Roeder and Roeder and Graves (1901 and 1905) undertook a more systematic search of the

Fig.1. Elevation drawing of the mine face at Engine Vein, Alderley Edge.
(the numbered notations are explained in the text).



neighbourhood showing a much wider ancient mining activity. They added four more sites of stone hammers; Windmill Wood, Dickens Wood (Stormy Point), Mottram St. Andrew and Engine Vein. At Engine Vein five circular pits were recorded which had been intersected by previous mining activity. Numerous stone hammers were found in the vicinity of this site and on clearing half of one of the pits (1905 p22f). They also excavated a similarly intersected pit at Dickens Wood (1905 p155f).

From Roeder and Graves's activity until relatively recently the Edge received little public attention except that the plethora of grooved stone hammers led to the widespread acceptance of the antiquity of the mining activity.

There have been two recent histories of the mines. Carlon (1978) has aimed at the more general public and his book is a repeat of earlier work, whilst Warrington (1981) is overtly rejectful of the grooved stone implements as being indicative of very early mining activity.

THE SUPERFICIAL PITS AT ENGINE VEIN

Roeder and Graves (1905) investigated the intersected pits at Engine Vein including the clearance of the western half of what they denoted as pit No. 3. They proposed that initially a line of pits had been dug and then joined by knocking out their sides. At the bottom they found small trial shafts no larger than 12 inches in diameter. They presented evidence for fire-setting to undercut the face from hearthstones of highly calcined lead ore and the blackened and brittle appearance of one face. They recovered large pieces of charcoal and a decayed stem of gorse from the bottom which are now at Grosvenor Museum. From their description the context seems to have been disturbed because a supposed iron pick, probably the remains of a boring rod (Warrington 1981 p51) was found in the central part of the excavated floor and gorse would not have survived the acidic conditions of the sand.

From the pit they recovered four complete stone hammers and twenty-two fragments, and half a quartzite hammer. A stone hammer was found in the large stope below, presumably fallen from a pit above. From the spoil heaps, presumably cleared out from previously worked levels by the Alderley Edge Mining Company, were found six complete and thirteen incomplete hammers. Additional fragments were found on both sides of the road and on the footpath to the east (1901 p82f).

On the south side an area of charcoal was discovered with rubbish heaps containing smelted copper and copper slag. The antiquity of these is, however, a matter of surmise. Many of the prehistoric sites on the Edge were identified by Roeder and Graves including a flint scatter along the southern edge of Engine Vein (1905 p19).

The sandstone about pit No. 3 is very soft and as a consequence the distinctive peck marks of the pits recorded in the elevation are absent. The pit appears to be of antiquity due to the absence of pick marks. The bottom lip of the left hand pit in the elevation has been truncated from below and appears to continue into pit No. 3, suggesting that they were originally continuous. The pits were partially destroyed by working in levels in the late 17th/early 18th centuries, and during later re-working along the fault line in the early 20th century. They were damaged more recently when the concrete safety cap was constructed in 1979.

METHOD

A working line was set up along the top of the face by a high tensioned wire produced by a Tirfor. From this a string of one metre square frames rather like a rope ladder were suspended and moved across the face by a cursor arrangement. The frame system was held against the face and photographed in metre squares per one metre spits. On the photograph the frame appeared trapezoid due to the depth of field caused by the overhanging angle of the face. To correct this for drawing the top cross-piece of the frame was printed at 1:10 and gridded 10 x 10. Each frame was then corrected to produce a mosaic of the face (Gale 1986 unpublished).

INTERPRETATION

It is notoriously difficult to date mining activity by tool marks alone. However, in this elevation the main phases of activity are represented by different extraction techniques identified by their characteristic tool marks.

Phase 1

A pitting technique of extraction with smooth and rounded surfaces. This consists of 1, initial pitting, phase 1(a) and two areas of associated re-working, 1(b) and 1(c), -

characterised by more punctate tool marks.

1a. These tool marks consist of circular dimples or peck marks typically 2.5 to 4.0 cm in diameter. Distinctive features associated with this technique are incut hollows or 'eyes'. The many stone hammers found at Alderley Edge in areas of this pitting technique and in the pits themselves suggest that these tools were responsible for the distinctive peck-marks. Five areas of these peck marks have been identified by Ia(i) to Ia(v) on figure 1.

1(b) A shaft-like feature cutting the eastern edge of the large pit. These tool marks appear to run in diagonal lines from successive blows of a pick. They are elongated, more incised and flared and deeper towards their base (3.5 by 2.5 cm to 7.0 by 3.0 cm). There are no incut hollows. (see Ib(i) on figure 1).

1(c) On the lower edge of the large pit there is an area of re-working characterised by smaller and more punctate marks than the surrounding peck marks. They average 2.3 cm in diameter. Their size and shape suggests blows from a pick at right angles to the surface. (see Ic(i) on figure 1).

Phase 2.

This phase is represented by working in levels as indicated by the picked egg and head holes of stemples. The pick marks are very narrow and sharp, and very distinctive. In the elevation there is evidence for two levels and a shaft between the two pits. At the surface on the right hand side there is a square cut step presumably to accommodate a stows. Other features include two large timber slots. As the main method of working at Alderley Edge was by underhand stoping (Nigel Dibben pers.comm.) these levels near the surface were probably cut in the late 17th/early 18th centuries.

Phase 3.

In order to extend working along the fault line it would have been necessary to remove the deads filling the levels. It would have been much easier to have blasted all this away. Three or possibly four short semi-circular smooth slots have been identified which are very probably shot holes. This activity may be dated to the late 19th century exploratory work by the Alderley Edge Mining Company.

DISCUSSION

The Edge is unique to Britain as it is the only copper mining site to have produced copious examples of these grooved stone hammers. The author has so far traced over 90 surviving stone hammers. None of these pebbles have been shaped although the majority of these are modified for hafting with a withy or rope, showing a greater diversity to this basic approach than any other site known to the author. In all cases the hafting modification has been pecked.

Many of the stone hammers have been grooved transversely while in as many as half again this has been combined with a lateral groove around the butt. In a few isolated cases the butt was cupped by a second lateral groove around the midriff of the pebble. The groove varies in form from shallow discontinuous pecking to a deep channel completely encircling the stone hammer. In a few cases the groove has become polished through use. Some examples have been 'notched' at the midriff rather than grooved or roughened by pecking presumably to provide a grip for hafting. These were also used in conjunction with grooves both transversely and laterally. The stone hammers from the prehistoric mining sites of North and Central Wales, however, were not grooved but sometimes modified by patches of pecking. In this area two sites, Copa Hill at Cwmystwyth, and the Great Orme, Llandudno, have now been dated by radiocarbon methods to the Early-Middle Bronze Age (Timberlake 1988 and James 1986). Unfortunately the pitting phase of mining at Alderley Edge is un-dated, although it is tempting to assign a Bronze Age date from parallels with the Welsh sites, Mount Gabriel, County Cork, and sites outside the British Isles. The primitive copper workings of Mount Gabriel are associated with pebbles identical to those at Alderley Edge, with broad medial grooves (Jackson 1968 p96). Radiocarbon dates firmly date the site to the Early Bronze Age (Jackson, 1968, 1984; O'Brien 1987).

Grooved stone hammers were found extensively during field surveying in the Province of Huelva, Spain, during the Huelva Archaeo-Metallurgical Project. Rothenberg and Blanco-Freijsiro (1981 p165) concluded that these tools were found exclusively at Chalcolithic mining sites.

"all such tools reported from later sites could well have originated from a Chalcolithic mining operation not identified. Many were not found in situ or found in secondary use or were falsely reported."

Identical stone mauls were found at Rudna Glava in north-east Serbia where open-cast iron mining exposed and partially destroyed ore following shafts of an early copper mine. Three pottery caches found on the access platforms cut at the tops of the shaft have been firmly dated to the first phases of the Late Vinca culture, i.e. the Early Chalcolithic (Jovanovic 1978).

In the Veshnoveh area of west-central Iran, old workings of distinctly rounded and smooth forms contained numerous grooved mauls (Holzer et al 1971 p4f). Unglazed pottery was correlated with Mesopotamian levels dated between the Chalcolithic and the Bronze Age, c.3200-3000 B.C.

At Timna, Sinai, flint implements and stone hammers are associated with Chalcolithic pit mining, while the rough shaft and gallery system of the Late Chalcolithic - EB1 was worked with perforated stone hammers (Rothenberg 1978). Only one grooved stone hammer has been recovered from Timna (Rothenberg, pers.comm.).

Previous to the above European work, some scholars recognised the inadequacy of regarding stone mauls as horizontal indicators of Bronze Age mining activity in the absence of closely datable remains, which were all too often a result of inaccurate antiquarian reports and mis-interpretation e.g.

"In Chester Museum is a sharply ovoid hammer-pick of prehistoric period, some rough rilled hammers probably of recent date, mediaeval strike-a-lights and a glazed rim. Thus Alderley Edge was worked principally in the Middle Ages" (Davies 1935 p35, footnote 7).

The Mediaeval strike-a-lights he refers to are Roeder and Graves's undiagnostic flint scatters of supposedly Neolithic settlements. The flints from Engine Vein were found above the pits on the southern borders and are, therefore, not associated with the mining pits. So far the author has been unable to trace the potsherd at the Grosvenor Museum.

Warrington (1981 p51f) rejected grooved stone hammers as indicators of prehistoric mining activities at Alderley Edge:-

"The grooved stone implements found in the Alderley district are not, therefore, associated with independently datable remains, and do not, on their own, afford unequivocal evidence of mining at any specific date.

Stones of suitable size and shape, obtained gratis from glacial deposits in the neighbourhood, could scarcely be surpassed, on grounds of economy and convenience as a component of tools for breaking or crushing ores of the type present at Alderley, and whether those artefacts are necessarily of any great antiquity is debatable. In the writer's view, it is conceivable that such utility implements were used at Alderley for ore crushing at least until superseded for that purpose, probably during the 18th century, by wind-powered machinery."

Briggs (1983) advocated grooved mauls as indicators of primitive ore-breaking operations of the mid-19th century at Mount Gabriel.

No historical or archaeological evidence has been produced to support the use of stone mauls, grooved or un-modified, during the mediaeval and post-mediaeval periods. In fact there is no conclusive evidence of the use of modified stone hammers in the Iron Age or Roman times as such claims occur from sites that could be associated with earlier mining activity.

Water-borne cobbles would have afforded a convenient and widely available solution for mining operations before the adoption of metal chisels by the Late Bronze Age. Grooved stone hammers were employed in the flint mines of the Rhone Valley in the south of France (Courtin 1974), Aachen and Kleinkems in Germany and Kvarnby, Sweden (Weisgerber et al 1980).

In the total absence of any evidence for the use of stone mauls during historical mining operations and the acceptance of these tools as typo-chronological indicators of Chalcolithic mining in Europe and Early-Middle Bronze Age mining in Wales and Ireland, an earlier Bronze Age date would seem most appropriate for the distinctive pit mining at Alderley Edge.

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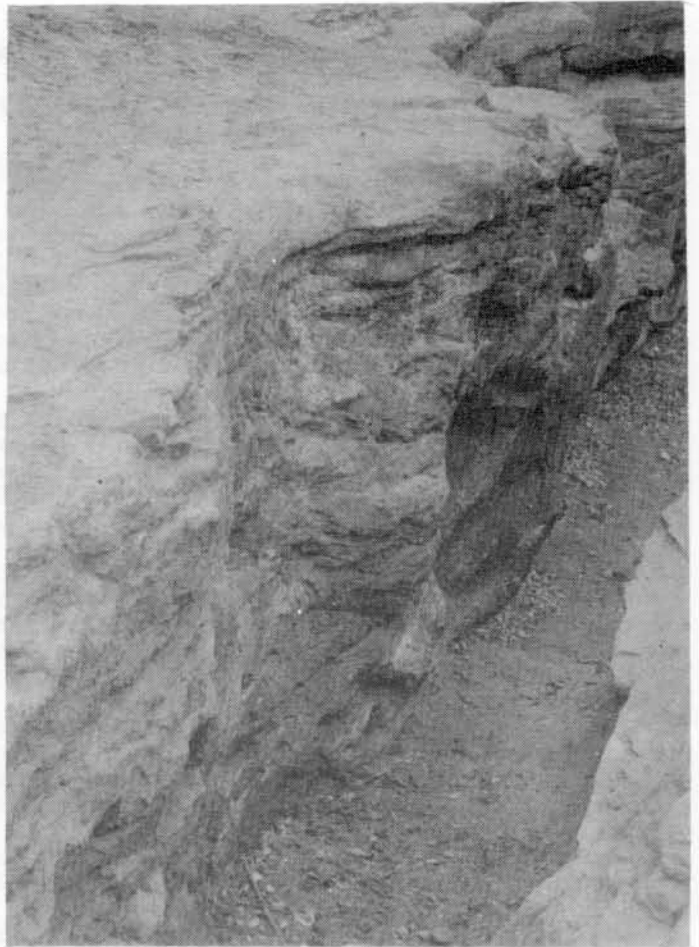
APPENDIX: STONE HAMMER FINDS FROM ALDERLEY EDGE

- 1) **Manchester Museum** has 46 stone hammers, five of which are on display.
 - (i) 28 are described as from Alderley Edge generally. 24 of these are modified for hafting.
 - (ii) Thirteen grooved examples and a plaster cast of a stone hammer with a double transverse groove from Brindlow.
 - (iii) Three examples from Engine Vein. One of these is un-modified and one is grooved.
 - (iv) One un-modified hammer from Dickens Wood
 - (v) One notched hammer found west of Engine Vein on the extension of the fault line during a survey by the Museum.
2. **Grosvenor Museum**, Chester, holds a collection of 17 stone hammers. 14 of these are grooved and there is a single un-modified quartz hammer from Engine Vein.
3. The **Ashmolean Museum**, Oxford, has six grooved examples.
4. The **Pitt-Rivers Museum**, Oxford, possesses six grooved stone hammers from Alderley Edge.
5. **Liverpool Museum** has three stone hammers according to the Cheshire Sites and Monuments Record.
6. **Warrington Museum** has two stone hammers from Alderley Edge on display in the Roman Room.
7. Two grooved examples are on display at the **National Trust Information Centre** at the Edge.
8. **Sheffield Museum** has two grooved examples in store.
9. The **Transport and Archaeology Museum**, Hull, has one complete grooved hammer and a fragment of another.
10. The **British Museum** has one grooved example from Alderley Edge.
11. The **Peak District Mining Museum** has on display a grooved stone hammer found below Pillar Mine. See note by Willies and Willies which follows in this Bulletin.
12. **Stockport Museum** has one damaged stone hammer from Alderley Edge.
13. The author possesses a fragment of a grooved stone hammer found at Pillar Mine.

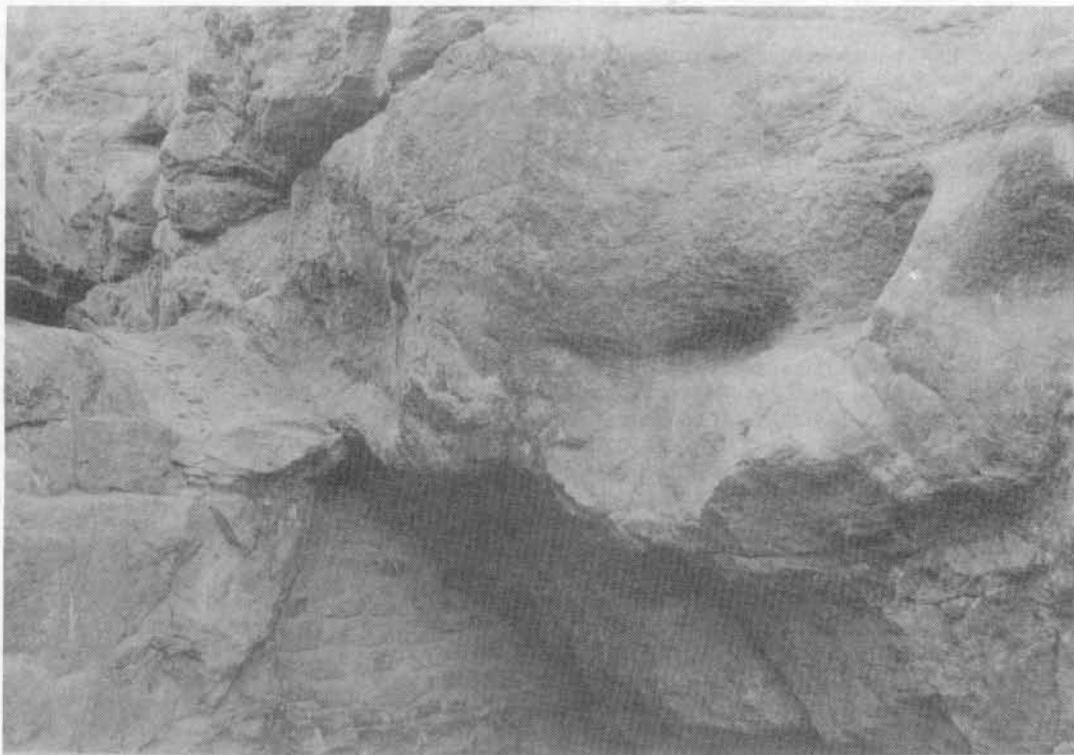
ANCIENT PIT WORKINGS AT ALDERLEY EDGE



1. Engine Vein openworks viewed from the west.



2. The intersected ancient pits at Engine Vein.



3. Engine Vein viewed from the east. Note the distinctive peck marks and the smooth and rounded appearance of the large pit on the right-hand side.