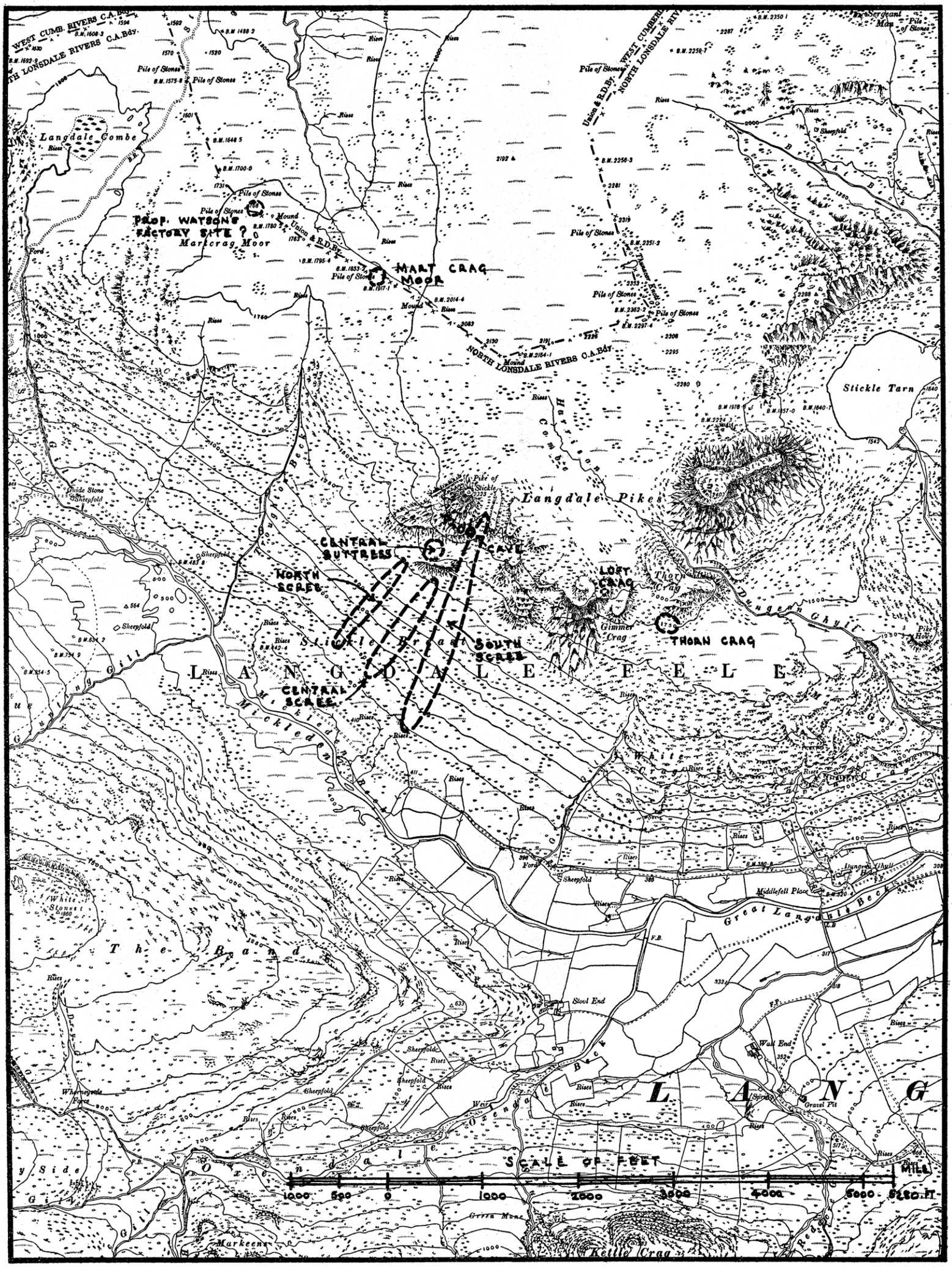


FIG. 1—GREAT LANGDALE FACTORY SITES.
(Reproduced, by permission, from the Ordnance Survey map).

ART. I.—*The Great Langdale stone-axe factory.* By CLARE FELL, F.S.A.

Read at Carlisle, March 25th, 1950.

DURING long ages before the discovery of metallurgy man learnt to use stone, wood, bone and antler to furnish himself with tools and weapons. By late Neolithic times he knew which stones were particularly suited to his purpose and sought them and exploited their supply. In chalk country flint was mined on a large scale as at Grimes Graves near Brandon, Norfolk and at Cissbury in Sussex, while in the mountainous areas men worked the igneous and volcanic rocks and traded the products widely through the country. At Graig Lwyd near Penmaenmawr[1] and Tievebulliagh in County Antrim[2] two such factory sites have been known for some time, but until the discovery of a similar site in Great Langdale, a preliminary report of which has already appeared in these *Transactions* (CW2 xlviii 214), it was impossible to point to the main source of the many axes in this country made from the volcanic rocks of the Lake District.[3] True, thirty years ago Professor D. M. S. Watson found a small working floor on Mart Crag Moor to the east of the summit of Stake Pass. This drew attention to the presence of at least a small industry in that area, but the significance of the find was not realised until Dr F. S. Wallis and Dr J. F. S. Stone

[1] *J. R. Anth. Inst.* xlix 342 f.; li 165 f.

[2] *Ibidem,* xxxiii 360 f.

[3] There are probably other axe-factory sites still to be found in the Lake District. For instance, Mr C. F. Tebbutt of St Neots found a struck flake on Broad Crag, close to the path leading from Esk Hause to Scafell Pike when walking there before the recent War.

showed, by their petrological studies, that axes of material identical with those from Stake Pass had been found in many parts of the country.[4] The importance of Mr Brian Bunch's discovery is therefore clear. A full report of the investigations up to June 1949 has already been published in the *Proceedings* of the Prehistoric Society, vol. xv, 1949, p. 1 f. The present paper deals more particularly with the local implications of the discovery.

Large numbers of flakes and roughed out axes have been found on the north side of Great Langdale on the slopes from Pike of Stickle to Dungeon Ghyll, but by far the greatest number come from the screes falling from Pike of Stickle (Pl. I). The full extent of the working area is not yet known, but the map (fig. 1) shows the sites from which material has been collected up to September 1949. The greatest activity was certainly centred on and about "South Scree", which falls from a wide gulley to the east of the summit of Pike of Stickle and extends to within a few hundred feet of the Mickleden valley bottom. Axes and flakes occur on the moving scree and at its sides, roughly between 750 and 2,000 feet O.D. This site was found by Mr Bunch and his wife in October 1947. In June the following year they returned to Langdale and continued to search the screes below Pike of Stickle, and discovered that discarded axes and flakes were also present in the screes to the west of the main site, marked "Central" and "North" on the map, and were abundant in a small hanging scree falling from the south crags of Pike of Stickle on to a rocky buttress, marked "Central Buttress" on fig. 1. Here, on a small platform covered with bents and bilberry, are large boulders surrounded by stone chippings and a few discarded implements showing where the axe-makers had worked. When Mr Bunch was searching for the small

[4] *Proc. Prehistoric Soc.* vii, 1941, 58 and xiii, 1947, 51.

working floor which Professor Watson had discovered, he found a second subsidiary site which yielded two axes and many flakes in an area where the peat had broken away. This site is marked "Mart Crag Moor" on the map. He also found a broken axe and flakes below Thorn Crag, close to the path leading from Dungeon Ghyll to Harrison Stickle. More axes were found at this site in September 1949. A traverse of the screes on both sides of the valley from below Kettle Crag, via Oxendale, the Band, Green Tongue, Stake Gill and Mart Crag to Stickle Breast and northward from Raven Crag above the Dungeon Ghyll Old Hotel via White Crag to Stickle Breast produced no evidence that these screes had been worked. Mr B. L. Thompson joined Mr and Mrs Bunch in Great Langdale on two occasions and visited the main sites with them; later that summer (1948) he and I examined the screes below the Churns of Bowfell, but found there no trace of the axe industry. Lt Col. O. H. North, accompanied by Mr E. S. Pinfold, collected much material from South Scree, Pike of Stickle, both in July 1948 and in June 1949.

Mr Bunch had noticed a small cave in the crags of the gulley on the east side of Pike of Stickle and had found two roughed out axes on its floor. The Council of this Society asked me to excavate this cave and permission to dig was obtained from the Lowther Estates Ltd. Mr E. S. Pinfold and his son, Mr B. L. Thompson and George Kaye joined me in September 1949 and we cleared half the cave floor (Pl. II). It lies at a height of about 1,800 feet O.D. and is irregular in shape, 5 feet wide at the mouth and with a maximum depth of 7 feet. A natural fissure extends for some distance into the rock at the back on the south-west corner; the roof has been split along the bedding plane and the sides are vertical. There is no doubt that the cave is artificial, but excavation produced no positive evidence to connect it with the axe-factory. The floor was composed of silt and stone

chips washed in from the hillside, varying in depth from ten inches to one foot nine inches according to the irregularity of the solid rock below. Certainly struck flakes were contained in the silt, but these may well have been washed in from the slopes above, as worked axes and flakes have been found on the scree at a higher level than the cave. There was no accumulation of flakes at the bottom of the deposit to suggest that this was in fact a quarry to provide material for the tools. It is doubtful whether any quarrying was necessary when such an abundance of scree was ready to hand. Possibly the cave was made in more recent times when ores, especially haematite, were being sought in the Lake District during the eighteenth century,[5] but Mr Pinfold does not support my suggestion.

Immediately to the west of the cave Mr Pinfold found several small workings with axes and flakes on the rocky ledges of the crag. These finds are marked "P" on the map. Later the same day we found another working floor immediately to the east of Loft Crag, at a place where the overlying peat had broken away. The site is about 2,000 feet O.D. and four implements and many flakes and blocks of stone, probably used as anvils, were found close together (Pl. III). All are heavily patinated. The material used here was not scree, but had been obtained from an outcrop of the particular band of volcanic ash which the axe-makers preferred. Immediately below Loft Crag, on its south face, there are many struck flakes in small screes, and Mr F. Barnes of the Barrow-in-Furness Museum reports that he found an axe below Gimmer Crag in August 1949. I think that many more working sites might be found if the outcrop of this particular band of rock was traced right round the valley. Mr Bunch's earlier traverse may not have been at the right altitude to strike the outcrop.

[5] John Postlethwaite, *Mines and Mining in the Lake District*, 1913, 127.

More than 130 roughed out axes and many flakes have now been collected. The bulk of the specimens illustrated in the *Proceedings* of the Prehistoric Society are now in the Carlisle Museum, Tullie House. A considerable collection is owned by Lt Col. O. H. North, and all the axes illustrated by line drawings in this paper are on loan to the Public Library and Museum, Barrow-in-Furness. Implements in many stages of manufacture have been found, and in the early stages the axes bear a striking resemblance to Lower Paleolithic forms, a fact which was noted in the Graig Lwyd report. All the implements are of pointed oval section. The longitudinal and lateral thinning flakes have the bulb of percussion and striking platform characteristic of man-made flakes, and have been struck from the butt end and sides of the implements, the upper and lower surfaces meeting at an angle averaging 55 degrees. The diagram (fig. 2) demonstrates these two kinds of flakes. It is probable that the tools were roughed out by resolved flaking against an anvil stone and that a hammerstone was used for the finer trimming. Only one hammerstone was found on South Scree. It was identified by Dr Agrell of the University Museum of Mineralogy, Cambridge, as a horneblende diorite granite, probably from Criffel, or Dalbeatie. Such granite has been recorded as erratics in the Eden Valley and on the fringe of the Lake District, but had not previously been noted within the mountainous area. There is no evidence that wooden, or bone, tools were used to remove the smaller flakes, and no polished axes have been found. The stone implements must have left the factory in an unfinished state and have been taken to the settlements outside the valley for grinding and polishing.

Fourteen specimens collected in September 1949 are illustrated in figs. 3-5. Axes 1-8 come from South Scree and 9 was found by Mr Pinfold to the west of the cave; nos. 10-12 are from the scree falling on to Central

Buttress and 13-14 are from Thorn Crag. These drawings, by Mr B. Mobsby, show the variety of axe forms, both thin and pointed butt types, and no. 4 is probably a roughed out adze. Several of the tools have snapped across during the course of manufacture and have been rejected. No. 13 is much rolled as are a number of other specimens recovered from the moving scree.

The rock used is a greenish grey volcanic ash, or tuff, of the Borrowdale volcanic series, varying considerably in colour and texture and sometimes weathering to an opaque white patina on the outer surface. Fourteen axes or flakes have been sectioned by Dr F. S. Wallis of the City Museum, Bristol, and classified by him according to the groups which he distinguished in his reports on the petrology of stone axes, published recently in the *Proceedings* of the Prehistoric Society. In addition, one axe and three flakes have been examined by the Geological Survey and classified by them under Dr Wallis's groups. The results obtained are shown at Appendix A. Although 89% of the material sectioned is of Group VI it is very interesting that Groups VIII and XI are represented by a single specimen of each from South Scree, particularly because no factory site connected with either group had previously been discovered. Mr J. J. Hartley, who published an account of the geology of Great and Little Langdale,[6] examined thin sections of the Group VI rock and stated that identical rock is exposed *in situ* at the Churns of Bowfell, Pike of Stickle above the screes and on Mart Crag, and described it as belonging to the bedded tuffs division of the Borrowdale Volcanic Series. This opinion is confirmed by Dr Mitchell of the Geological Survey. Up to September 1949 thirty-seven specimens of Group VI (excluding the finds from Stake Pass and Great Langdale) and only five of Group VIII and two of Group XI had been identified. These small groups must represent

[6] *Proc. Geological Ass.* xliii, 1932, 32-69.

narrower bands of rock exposed somewhere on the face of Pike of Stickle and used occasionally along with the more abundant Group VI material.

The distribution map (fig. 6) is misleading unless it is remembered that the only area where intensive petrological study of stone axes has been carried out is that covered by the South-Western Group of Museums and Art Galleries, while work in the intervening areas either has not begun at all, or has been very spasmodic. This area has been delimited on the map. A key to the numbers is given at Appendix B. Despite these limiting factors the distribution does throw some light on the mobility of early man in this country.

Owing to the altitude of the site it is probable that work there was seasonal, taking place in the late spring or summer, and that the roughed out material was carried away to be finished at the more permanent settlements beyond the valley. In Great Langdale itself a broken chisel was found at Robin Gill[7] and a large unpolished axe is recorded from Loughrigg Tarn.[8] Another unfinished specimen, very similar to the Pike of Stickle material, was found at, or near, the Hirdwood Circle in Troutbeck[9] and two polished specimens, probably of the same stone, come from Ibbotsholme, Troutbeck Bridge.[10] Except for the gravel outwash where the Trout Beck enters Windermere, its shores will have been too thickly wooded and its soil unattractive to early agricultural people, but, down the lake and following the Leven towards the sea, suitable light sandy soils and limestone areas occur. Axes found at Winder Moor, Cartmel and described in the *North Lonsdale Magazine* vol. i (1867) p. 305 (Note), again sound like volcanic ash from Great Langdale. From Furness, too, there is evidence of early

[7] CW2 xxix 331.
[8] PSAL2 vi 438.
[9] CW2 i 135.
[10] CW2 iii 411. These axes are now owned by Mr B. L. Thompson.

settlement and many stone axes were collected at Stone Close, Stainton,[11] and at High Haume, Holmes Green, near Kirkby Ireleth.[12] An unpolished specimen from Stainton, now in the Barrow-in-Furness Museum, certainly looks as though it came from the Great Langdale factory.

Two Group VI axes were found in the sandhills settlement at North End, Walney. They are both of small size, possibly retrimmed from larger specimens, as a number of flakes were collected with them. Perhaps this site was reached down the Duddon valley, by which route an axe found at Waterblean, near Millom, may also have travelled.[13] Axes from Eskdale suggest that the route by Ore Gap, or Three Tarns, was used at this time. Miss M. C. Fair recently sent two axes to the Geological Survey for examination and I quote Dr K. C. Dunham's report. Both axes are in Miss Fair's possession: —

(i) *Survey No.* 1005. Cutting portion of a polished axe with side-bands from "Deid Nook", Gatehouse, Eskdale Green.

An intermediate tuff of variable texture. Parts of the rock closely resemble the typical fine-grained Pike of Stickle tuff, but elsewhere in the rock fragments of oligoclase, chalcedonic silica and fine grained andesite attain widths of 0.2 mm. Epidote is present in rounded nests. The matrix of the rock is extremely fine-grained isotropic material. Variations in grain size are to be expected in tuff bands such as that exposed in Langdale and the rock may well belong to that area, I have no alternative suggestion to offer.

(ii) *Survey No.* 1006. Unfinished "block" implement. Wasdale Screes, West End, South Slope, Porterthwaite.

A fine-grained, blue-green intermediate tuff containing recognisable fragments of oligoclase. No epidote was found in the section. The patina is remarkably heavy, the cross-section showing a thickness up to 9.0 mm, with an average near 5.0 mm. A rim rich in light-reflection surrounds the fresh rock and

[11] CW2 xii 281.
[12] C. M. Jopling, *Sketches of Furness and Cartmel*, 95.
[13] CW2 xxiv 360. This axe is now owned by the Hon. M. Cross.

is 1 mm thick. The remainder of the altered rock is pale brown, showing a tendency for concentration of iron oxides towards the inner margin. The nature of the clay mineral, or minerals, composing this material is unknown. The tuff is, however, closely similar to that of Pike of Stickle.

On the Cumberland coast three Group VI axes have been identified—a broken axe from Gray Crofts stone circle, Seascale, found by Mr W. Fletcher during the excavations undertaken by Pelham House School (Dr Wallis's No. 531); and two from the Neolithic settlement at Ehenside Tarn, one a very fine, thin-butted, polished axe of "Cumberland" type and the other a smaller, roughed-out axe with pointed butt. Both specimens are in the British Museum (Dr Wallis's Nos. 556-557). Both sites were probably reached via Eskdale.

A fourth possible route is by Stake Pass into Borrowdale. Subsidiary working floors have been found on Mart Crag Moor from which the track runs north by Langstrath. At Portinscale a small workshop was recorded by Canon Rawnsley[14] and the axes, now in the Fitz Park Museum, Keswick, are very like the Great Langdale tools both in type and in material. However, from the description of the find it appears that the material used was river cobbles, and it is not possible to claim the Portinscale site as a place where axes from Great Langdale were finished. Three axes of "Cumberland" type found at Belmont, near Penrith, have not been examined petrologically, so their origin is unknown.[15]

It is probable that these four valleys, radiating from the central dome of the Lake District, played their part in the first stage of the dispersal of the stone axes from Great Langdale. The cultural unity of the Irish Sea area in prehistoric times has often been emphasised and the occurrence of Group VI axes in the Isle of Man and

[14] CW2 ii 418. There are two other unpublished axes from Portinscale in the Fitz Park Museum.
[15] CW2 xxxvii 152.

in west Scotland confirm that sea-borne trade was firmly established. Mr R. B. K. Stevenson of the National Museum of Antiquities of Scotland, Edinburgh, thinks that many other Scottish stone axes may prove to have originated in Westmorland; and Mr B. R. S. Megaw of the Manx Museum claims that about a third of all the stone axes found in the island are identical with the tuff of Great Langdale. The journey southward to Wiltshire and beyond may also have been undertaken mainly by boat. There is a very fine unpolished axe from the Morecambe Golf Course (now in the Lancaster Museum) which almost certainly came from Great Langdale, and Group VI axes from Gloucester and from Bournemouth suggest that the Severn and the Hampshire Avon were routes used in the axe trade. It is probable that trading overland was by stages as among the Australian Aborigines to-day, and that the journeys were arranged to coincide with festivals of magical and social significance. Journeys across the Pennines were undertaken, either by the Aire Gap, or over Stainmore, or by the Tyne/Irthing route, but little evidence of this so far exists.

Finally, there is the problem of date and duration of the factory. The tools are of thin-butted, or thin pointed butt type and are characteristic of late Neolithic times. At Ehenside Tarn both types occur together and should be contemporary. A few axes, or fragments, of Groups VI, VIII and XI have come from dateable contexts and all suggest a late Neolithic, or Early Bronze Age date. At Windmill Hill, near Avebury, imported implements of igneous rock occur only in the upper, or late Neolithic levels[16]; at Abingdon, Berks.,[17] a Group VI axe was found in association with Neolithic A.2 pottery, a flint sickle and an Early Bronze Age flint dagger of "Beaker" type; at North Deighton, Yorkshire, a Group VI axe

[16] *Proc. Prehistoric Soc.* vii 69.
[17] *Ant. J.* vii 448, fig. 5a; viii 469, pl. lxxvii, fig. 1.

fragment was found with Neolithic B (Peterborough) pottery on an occupation floor underlying an Early Bronze Age barrow; and at Cairnpapple Hill, Torphichen,[18] Professor Stuart Piggott equated Group VI axe fragments with the late Neolithic cremation cemetery which formed the first stage in the building of the barrow. In our own area, we have three sites which help in dating the axe trade—first, North End Walney,[19] where Group VI axes were found with a flint industry of late Neolithic and Early Bronze Age character; second, Gray Crofts, Seascale, where a broken axe was found near one of the fallen stones of the circle, though its connection with the circle is uncertain. This circle surrounded a cairn containing a central cremation burial and was probably built not later than the beginning of the Middle Bronze Age, about 1400 B.C.; and third, at Ehenside Tarn two Group VI axes come from a late Neolithic A.2 settlement.[20]

These findings confirm the opinion expressed by Mr T. A. Glenn, in *Archæologia Cambrensis* xc 189, that the trade in stone axes was active towards the end of the Neolithic Period and that its full expression can be attributed to the Neolithic B, or Peterborough people—probably from about 1900 B.C. No axes from the main factories have come from purely Bronze Age sites and it is felt that the trade was an extensive, intensive and short-lived venture diminishing rapidly with the introduction of bronze tools in the south and east. Here, in the north-west, stone implements must have remained in use until the full development of the Irish bronze industry and even then they will have continued to supplement the supply of metal tools. Perhaps the Great Langdale axe industry continued to supply local needs at least until the end of the Early Bronze Age.

[18] *Antiquity*, March 1949, 32.
[19] CW2 xlvii 68-77.
[20] *Archæologia*. xliv 273.

I should especially like to thank Mr Brian Bunch for letting me examine his finds and for preparing figs. 1 and 6; Lt Col. O. H. North for making his collections available for study; Mr B. L. Thompson for help in many ways; Dr F. S. Wallis, Dr J. F. S. Stone, Professor Stuart Piggott and Mr R. B. K. Stevenson for allowing me to make use of unpublished material resulting from their researches. My thanks are also due to all who helped to collect the material and to those who gave advice in the preparation of this paper.

APPENDIX A.

Axes and flakes from the Great Langdale axe-factory sectioned by the Stone Axe Sub-Committee, South-Western Group of Museums and Art Galleries, and by the Geological Survey and Museum.

1. *Group VI.* An altered basic tuff. The axes found by Professor D. M. S. Watson near the Stake Pass belong to this group.

S-W Mus. No.	*Object.*	*Site.*	*Where published.*	*Present Location.*
374.	Rough axe	South Scree Pike of Stickle	*Proc. Prehistoric Soc.* xv. I ff, fig 4 no. 11	Carlisle Museum, Tullie House.
378.	Flake	,,	,,	Department of Prehistory, Edinburgh.
425.	Rough chisel	,,	,, Pl. IV (upper) no. 1	Carlisle Museum, Tullie House.
426.	Broken axe	,,	,, Fig. 5, no. 16	,,
427.	Broken axe	,,	,, Fig. 5, no. 17	,,
428.	Rough axe	,,	,, Fig. 4, no. 10	,,
429.	Flake	,,	,, Fig. 2, no. 4	,,
430.	Flake	,,	,, Fig. 2, no. 5	,,
438.	Rough axe	,,	,, Fig. 4, no. 9	,,
439.	Broken axe	,,	,, Fig. 5, no. 20	Lt.-Col. O. H. North, Clifford Hall, Yealand Conyers.
440.	Broken axe	Thorn Crag	,, Fig. 6, no. 26	Carlisle Museum, Tullie House.
441.	Rough axe	South Scree, Pike of Stickle	,, Fig. 3, no. 8	,,
E.22625	,,	,,	,,	Geological Survey and Museum.
E.22773 - 22775	Three Flakes	,,	,,	,,

2. *Group VIII.* A silicified rhyolitic glass, fine tuff, or sediment.

377.	Flake	South Scree Pike of Stickle	*Proc. Prehistoric Soc.* xv I f.	Department of Prehistory, Edinburgh.

3. *Group XI.* A highly silicified rock of very fine grain with opaque white spots.

530.	Broken axe	South Scree Pike of Stickle	*Proc. Prehistoric Soc.* xv I f.	Carlisle Museum, Tullie House.

APPENDIX B.

Key to the distribution map. One specimen from each place unless otherwise stated.

Group VI.

1. Stake Pass, Great Langdale (Professor Watson's site). 6.
2. Axe factory, Great Langdale.
3. North End, Walney Island. 2.
4. Windmill Hill, Avebury, Wilts. 5.
5. Avebury, Wilts.
6. Big Penning, Avebury, Wilts.
7. Swindon, Wilts.
8. Wyle, Wilts. 2.
9. Gloucester.
10. Andoversford, Glos.
11. Sutton Courtney, Berks.
12. Abingdon, Berks.
13. Bedwell Pool, Alvescot, Oxon.
14. Rush Weir, Bampton, Oxon.
15. Bridge of Down, Upwey, Dorset.
16. Roman Road, Broadstone, Dorset.
17. Redhill, Bournemouth, Hants.
18. Willesley Warren, Kingsclere, Hants.
19. Frensham, Surrey.
20. Chalgrove, Bucks.
21. Oundle, Northants.
22. Curdworth, Birmingham.
23. North Deighton, Yorks.
24. Torphinchen, West Lothian.
25. Santon, Ballaver, Isle of Man.

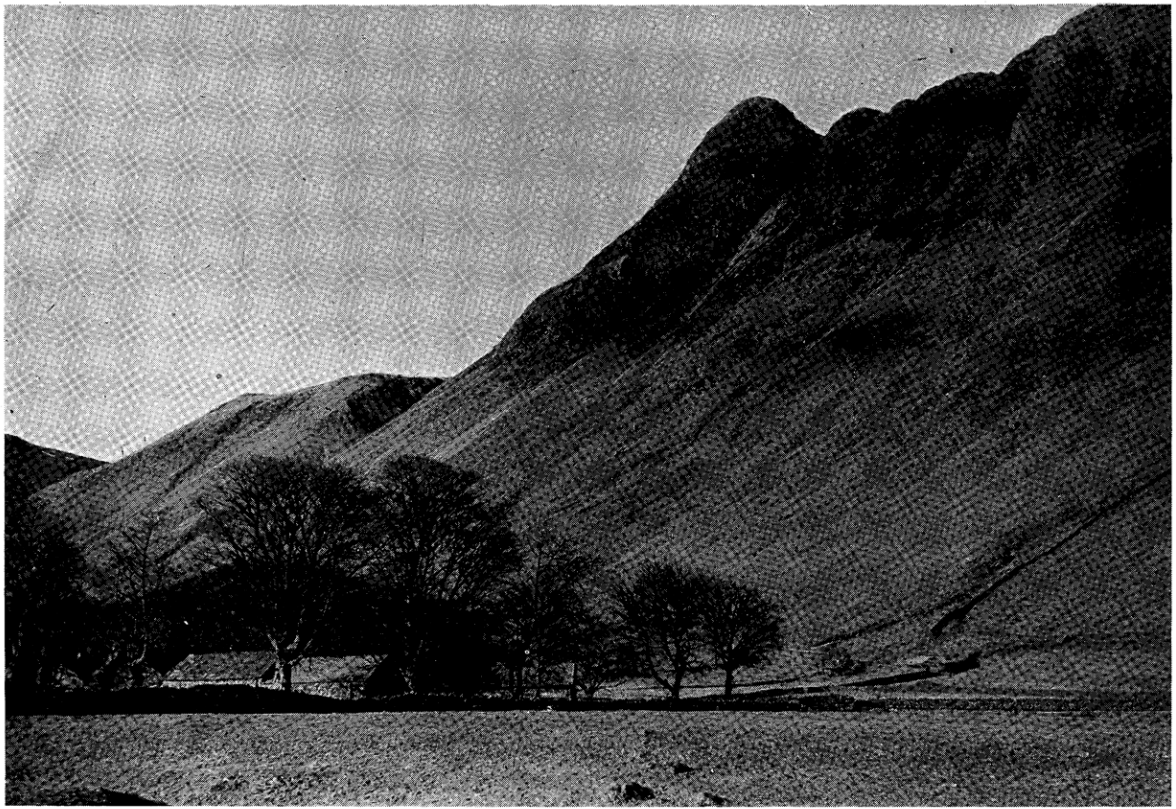
26. Jurby, Ballacurry, Isle of Man.
27. Minster Lovell, Oxon.
28. Drunmore, Wigtown.
29. Twynholm, Kircudbright. 2.
30. Kilcreggan, Argyll.
31. Grey Crofts, Seascale, Cumb.
32. Ehenside Tarn, Beckermet, Cumb. 2.
33. Leicester. 2.

Group VIII.

1. Great Langdale axe-factory.
2. Trebinshum Farm, near Brecon.
3. Windmill Hill, Avebury, Wilts. 3.
4. Bluntisham, Hunts.

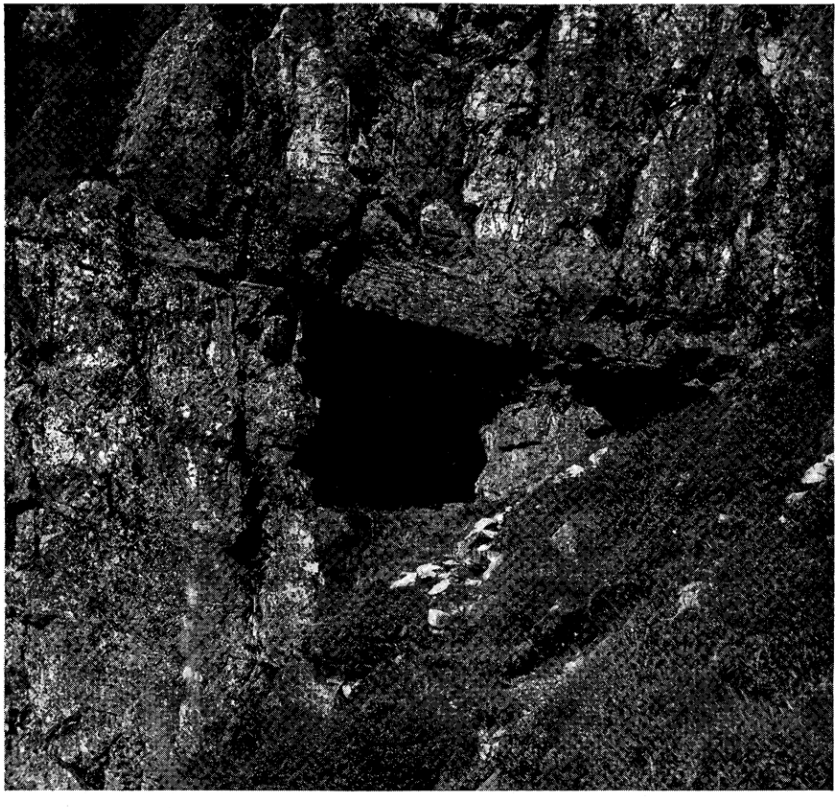
Group XI.

1. Great Langdale axe-factory.
2. Windmill Hill, Avebury. 2.



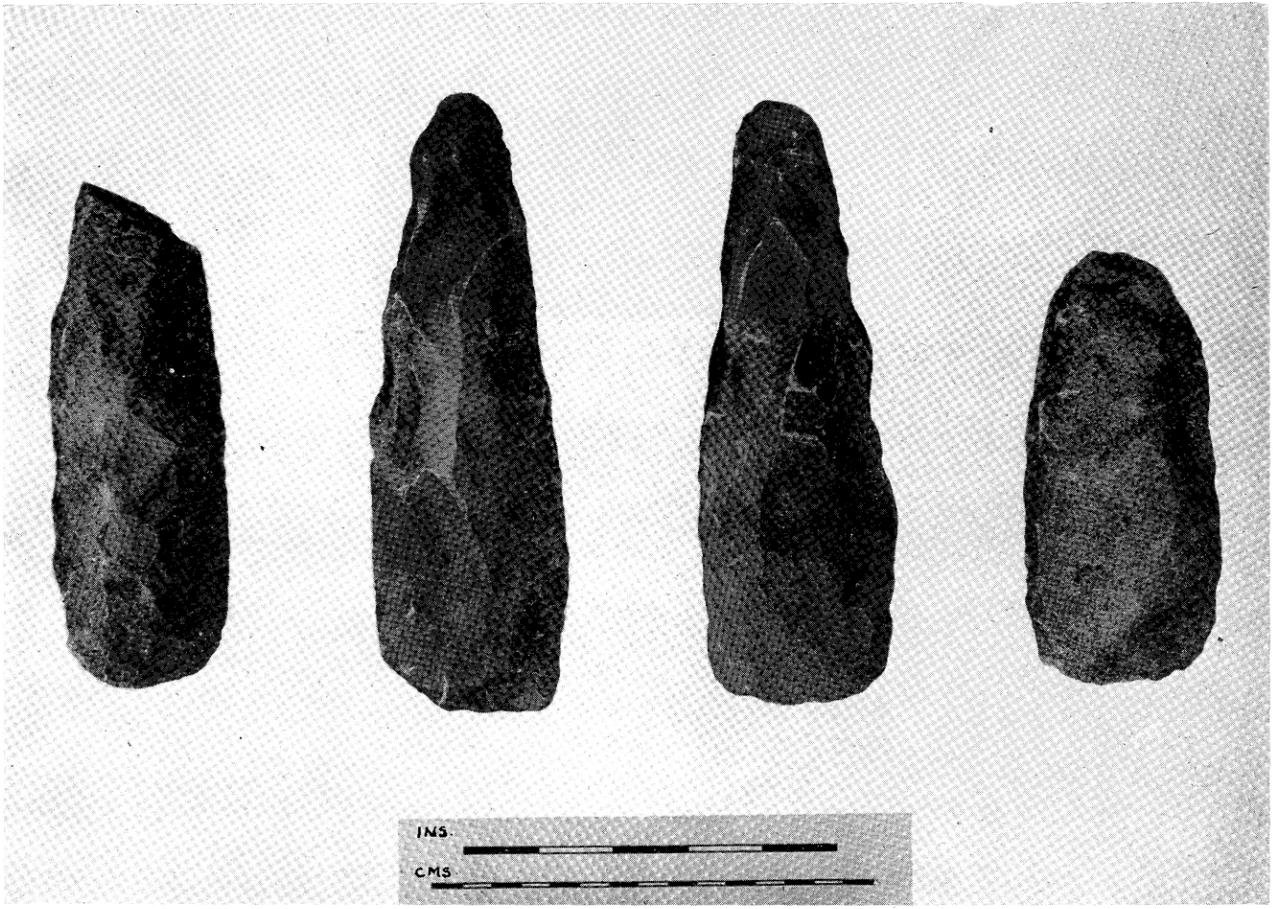
Pl. I—Pike of Stickle and the Screes from Stool End.

facing p. 14. *Photo. by Sanderson & Dixon, Ambleside.*



Pl. II—The cave in the Gulley, Pike of Stickle.

facing p. 14. *Photo by B. L. Thompson.*



PL. III—Axes found to the east of Loft Crag.

facing p. 14.

Photo. by L. P. Morley.

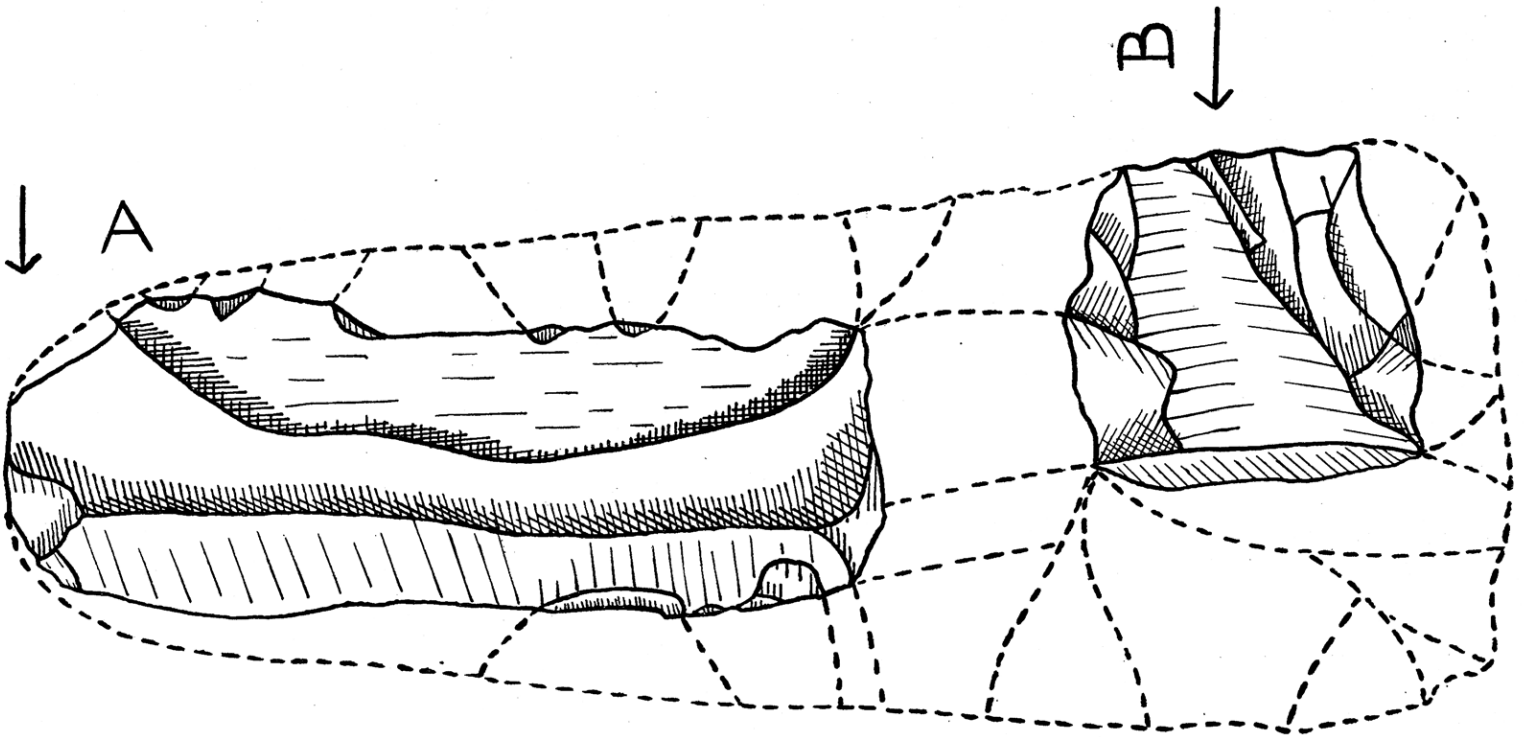


FIG. 2.—A: Longitudinal thinning flake (no. 377, group VIII).
B: Lateral thinning flake. The arrows indicate the direction of the blow which detached the flakes.

facing p. 14.

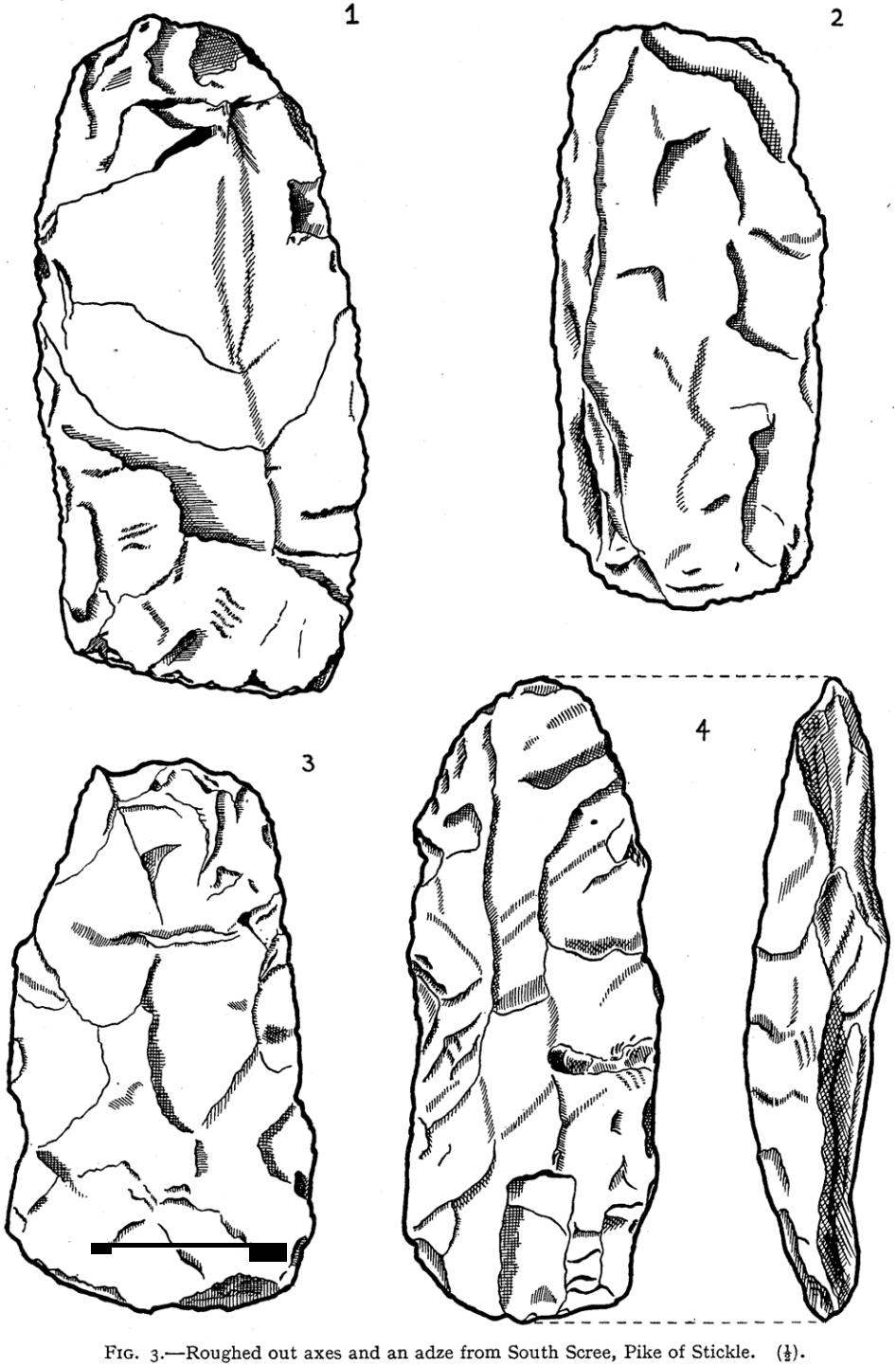


FIG. 3.—Roughed out axes and an adze from South Scree, Pike of Stickle. (½).

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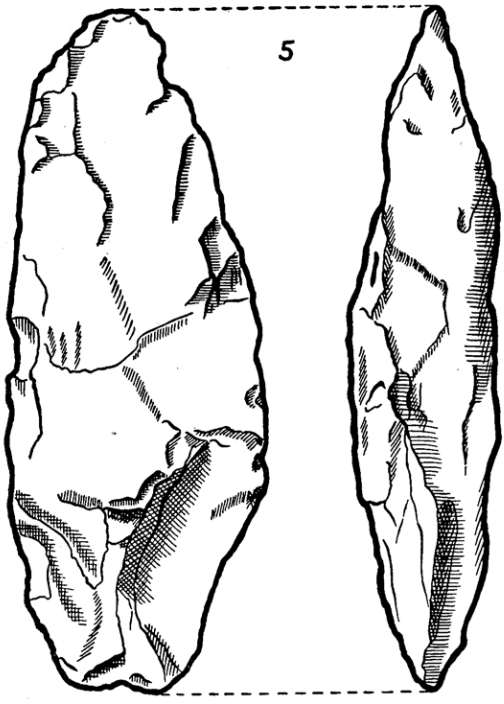
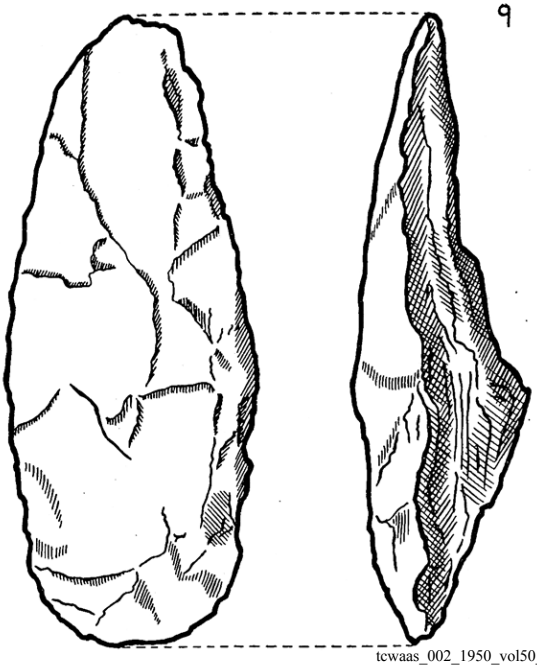




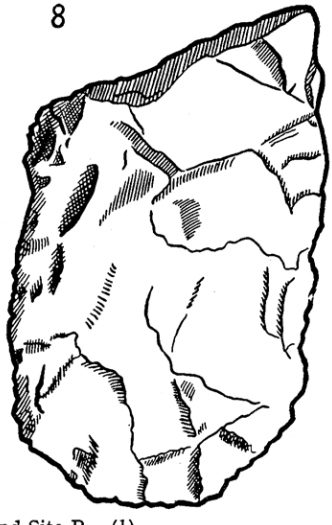
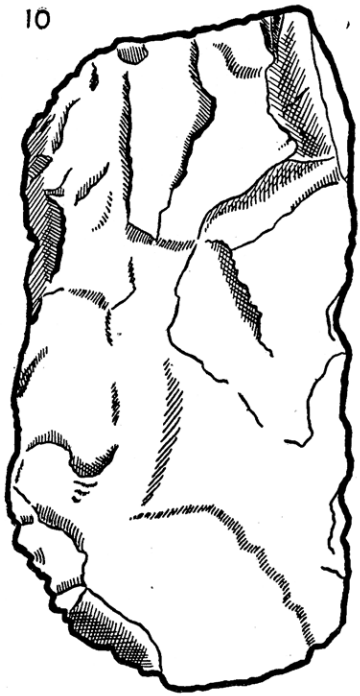
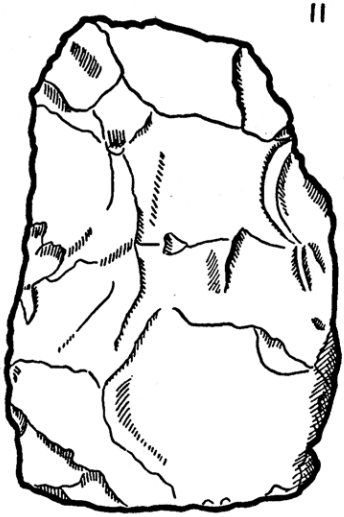
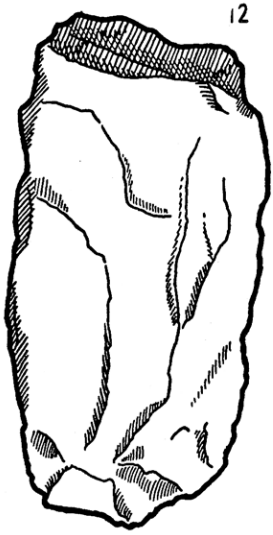


FIG. 4.—Roughed out axes from South Scree and Site P. (½).

facing p. 14.







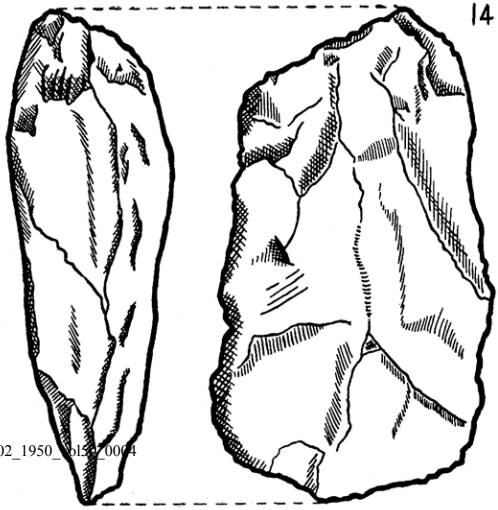


FIG. 5.—Rough out axes from Central Buttress and from Thorn Crag. ($\frac{1}{2}$).

facing p. 14.

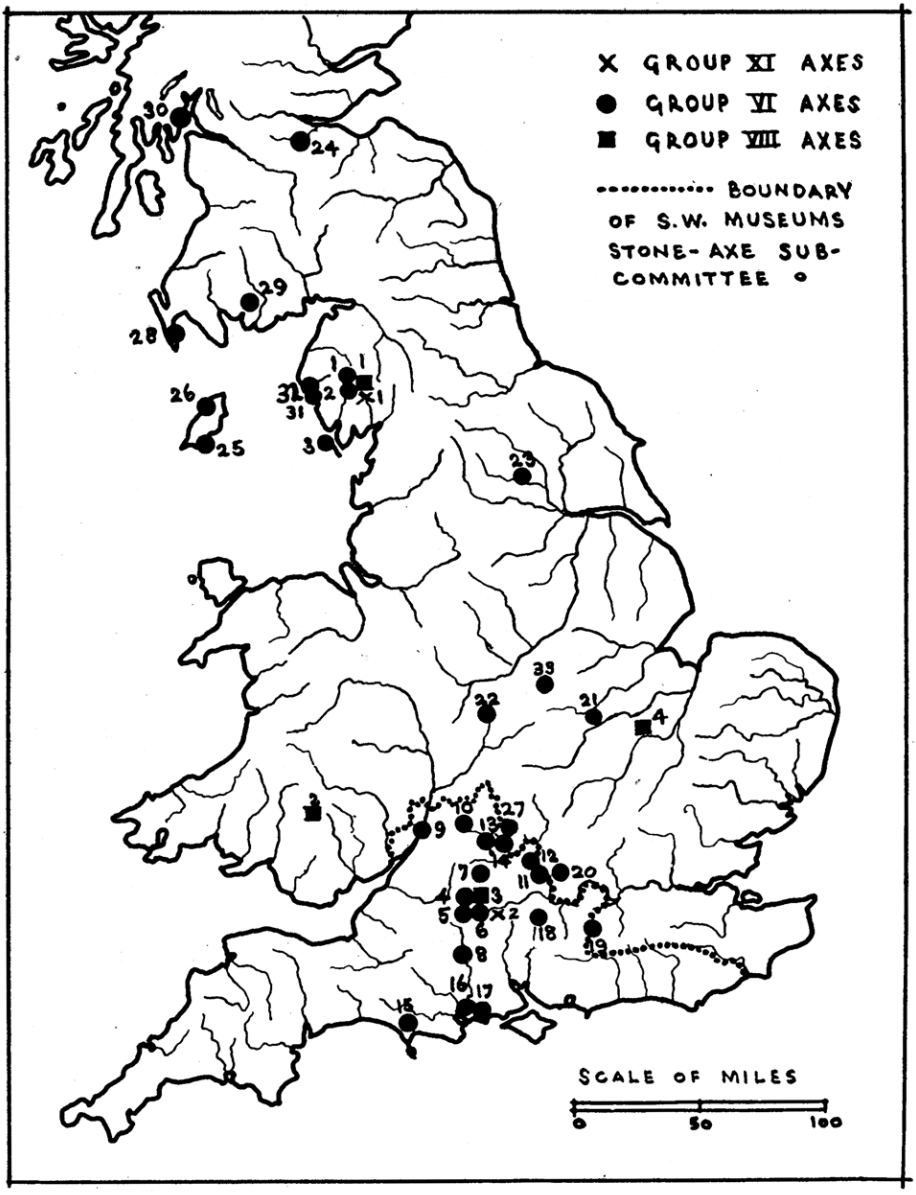


FIG. 6.—Distribution of Great Langdale axes (up to September, 1949).

facing p. 14.