Society of Antiquaries of Scotland

Rhum

Mesolithic and Later Sites at Kinloch, Excavations 1984–86

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THE SOURCES OF RAW MATERIAL

Two different materials were exploited for the manufacture of the majority of the flaked lithic artifacts, and these were supplemented by a small quantity of other rocks (Tab 2). All are chalcedonic silicas. The predominant materials are flint and a hydrothermal chalcedony, here called bloodstone. The other materials include agate, quartz, silicified limestone, and volcanic glass. The frontispiece to this volume gives an indication of the nature of the range of raw materials recovered.

FLINT

A few small, rolled, flint nodules were recovered. The flint is characteristically smooth textured and mottled grey/white in colour. It appears to be extremely corticated and a number of pieces contain visible fossils. Many of the flint artifacts retain a weathered cortex suggesting that small rolled pebbles provided the basis of the raw material. Flint such as this was commonly used for prehistoric assemblages throughout the coastal areas of western Scotland. Although nodules are only rarely found throughout the area today, it would seem that the material was not so scarce in the past. It is possible that nodules were brought in from flint-rich areas such as the Antrim coast, but the size, ubiquity, and homogeneous nature of the archaeological material throughout the Western Isles suggests that a more local supply existed. Flint beds extend away from the northern coast of Ireland (Wickham-Jones & Collins 1978, 7), and the transportation of nodules by both seaweed and ice has been recorded (Piggott & Powell 1949, 160; Werner 1974). It seems likely that in early prehistory, at least, flint was washed up on the coasts of the west of Scotland in sufficient quantities to provide some stone tools, and it is likely that this included the beaches of Rhum. The types of flint debitage present at Kinloch demonstrate that whole nodules were reduced on site in the manufacture of tools (Chapters 5 and 6).

BLOODSTONE G DURANT D GRIFFITHS & D SUTHERLAND

Bloodstone is a cryptocrystalline silica which occurs in association with the lavas of Tertiary age that form Fionchra and Bloodstone Hill in the west of Rhum. The silica minerals occupy amygdales (the irregular cavities and fissures that exist within a lava flow) and they were deposited here from hydrothermal solutions as they percolated through the rocks at some stage after the consolidation of the lavas. Several different varieties of silica are present at Bloodstone Hill, but the detailed formation processes are not, as yet, understood.

The different silicas are recognisable by their markedly different colours, from red (jasper and carnelian), through light green (plasma), to a dark green (heliotrope) and a purple chalcedony. In addition, there is great variety in grain size and surface texture within any one colour type. An individual nodule may contain silicas of markedly different colour and quality. There is little agreement as to terminology in the geological literature but technically the term bloodstone should be reserved for the fine textured dark green nodules that are shot through with red. This particular material has long been sought after by jewellers, and in the nineteenth century a small quarry was established at the northern end of Bloodstone Hill to exploit a particularly good seam. In prehistory, however, there was no such selection: all varieties were transported to the site at Kinloch and all varieties were used for tools. Although the individual names are important to a geologist, the prehistoric population apparently made no distinction between the formal varieties, and here they have been grouped together for archaeological purposes under the term *Bloodstone*. This term was retained because of its specific associations with the island of Rhum and with the transport of stone from that island, whether in the 19th century or in prehistory.

The main sources of bloodstone are on Rhum, but outcrops have been recorded elsewhere amongst the Tertiary volcanic systems of the west coast of Scotland, and it was felt necessary to visit all of the possible sources and to analyse more specifically the provenance of the archaeological material (Chapter 13). Although conclusive source analysis was not in the end possible, the preliminary sourcing work, together with both the scarcity and the poor quality of the material at the other geological sites, suggests that bloodstone was obtained in prehistory from Rhum. Examination of the sources on Rhum, at Fionchra and at Bloodstone Hill, showed that the material from Fionchra is quite unlike that exploited at Kinloch, or indeed anywhere else. All the evidence suggests that the predominant source of bloodstone in prehistory was Bloodstone Hill.

Bloodstone Hill (NG 315007) stands at the southern edge of Guirdil Bay (Ills 1 and 95), on the opposite side of the island to the site at Kinloch. There was no evidence in either till or beach deposits for the natural transportation of nodules across the island, indeed the direction of ice-flow appears to have been from east to west. The prehistoric population of Kinloch must, therefore, have crossed Rhum in order to obtain bloodstone. At Guirdil there are three potential sources of bloodstone: the outcrops at the top of Bloodstone Hill, the talus on the flanks of the hill and the gravels on the beach below. The outcrops are difficult of access, however, and the cortex present on the Kinloch pieces indicates that eroded, slightly abraded nodules were used. These are more likely to have come from a secondary source such as the talus or the beach gravels.

Today the talus slopes of Bloodstone Hill are extensively vegetated, and they are likely to have been so throughout prehistory. This vegetation means that pebble nodules are not easy to obtain from the talus in large quantity. The beach, however, is not vegetated and large numbers of bloodstone nodules of all types, sizes and qualities may still be collected there. Fieldwork at Guirdil suggests that the period of the most abundant 'production' of bloodstone fragments was during the Loch Lomond Stadial, and that the time of greatest transport of material from the talus to the beaches was likely to have been during that Stadial and the very early Flandrian. During most of the Flandrian the fresh release of bloodstone fragments from the outcrops is likely to have been low so that most of the bloodstone in the more recent raised beaches, and in the present beach, is probably reworked earlier material. The present beach is constantly reworked by the sea; this results in the disintegration of those bloodstone fragments with a high vesicle content, while the more coherent and mechanically sound bloodstone will be left behind. In this way the bloodstone on the beaches is not only the most easily located source of bloodstone (both now and in prehistory), but it is also of a naturally selected higher quality than that occurring on the talus. Continued reworking today means that the bloodstone presently available on the beach is likely to be of consistently higher quality, though less abundant, than that in prehistory. With this caveat in mind, material from the beaches was used as the basis for all of the experimental knapping undertaken to test the flaking properties of bloodstone.

Even after beach sorting there is still great variation in quality amongst the nodules available on the beach today. The evidence from Kinloch suggests that in prehistory nodules were tested and primary flakes removed at Guirdil before transportation across the island (Chapter 6). Although the distance involved is not great, a mere 12 km by land, it would clearly have made sense to ensure that waste material was not transported, whether as poor quality nodules or as cortical flakes. However, with the exception of a very few flakes, there is no evidence for the working of stone anywhere at Guirdil (Chapter 13), but if this were carried out on the beach then the waste material would quickly have disappeared and further up the Guirdil Glen the present land cover makes the identification of prehistoric sites difficult.

AGATE, QUARTZ, SILICIFIED LIMESTONE, AND VOLCANIC GLASS

A variety of other siliceous rocks was used to supplement the flint and bloodstone. Agate and quartz outcrop at Bloodstone Hill; they also occur as pebbles on the beaches, and were probably collected together with the bloodstone.

Silicified limestone outcrops on the west coast of the island of Eigg, at Clach Alasdair to the southern end of Laig Bay (NM 455 883), immediately opposite the south east coast of Rhum. It is a glassy, coarse-grained material and, although it has a well developed conchoidal fracture, it was not used in great quantity in prehistory. At the source it may be seen to contain numerous heat fractured nodules of flint, and fragments of these were visible within some of the artifacts on site. Although the journey to Eigg from Rhum is short, the limestone is not present at Kinloch in great enough quantity to suggest any organised collection directly from the source, and this material may well have been washed up on the shores of Loch Scresort alongside the flint. Until this source was inspected, artifacts of this material were classified as quartzite. Although no local quartzite sources have been located, the two materials are macroscopically similar and, as not all of the pieces have been individually tested, it is possible that some genuine quartzite artifacts have now been classified as limestone.

The volcanic glass is a dark green vitreous material. It is homogeneous in texture, and it appears to have a good, if somewhat brittle, conchoidal fracture. Outcrops have been found on Eigg, and it is possible that this is the source of the pieces from Kinloch. If so, these pieces reinforce the view that the prehistoric inhabitants of Kinloch made use of the suitable raw materials that were locally available. The volcanic glass is, however, similar in appearance to Arran Pitchstone, and it is possible that it came from the island of Arran. Pitchstone was transported over long distances, especially in the neolithic and bronze age (Thorpe & Thorpe 1984), but it is worth noting that none of the usual pitchstone artifacts, such as small blades or blade cores, were present at Kinloch.

RAW MATERIAL IDENTIFICATION B FINLAYSON & G DURANT

As a part of the detailed examination of the assemblage it was obviously of interest to be able to assess the relative use made in prehistory of the different raw materials. There were few artifacts of agate, quartz, limestone and volcanic glass, so attention was concentrated on the two main materials, bloodstone and flint. These are both very similar and it was necessary to examine a variety of possible discriminatory techniques in order to distinguish between them.

The first techniques used were the examination of hand specimens and of thin sections from control nodules of known source (Durant mf, 1:E10–F7). From these a number of possible discriminatory features were listed: colour, spherulites of iron calcite, fossils, coarse crystalline quartz and agate banding. It was recognised, however, that there are samples which do not carry any of these distinguishing characteristics. Chemical analysis was tried next in order to develop the identification of the two materials, and both major and trace elements were picked out as being of possible use (Durant mf, 1:E10–F7). The sample size was too small to test the conclusions fully, however, and the situation was further complicated by the large size of the Kinloch assemblage and the considerable variation within each raw material type. A number of other techniques (cathodoluminescence, stable isotope analysis and scanning electron microscopy) were suggested, and X-ray flourescence, electron spin resonance spectroscopy and transmission electron microscopy were also considered. However, all these techniques suffer from expense, lack of speed and the need to build up a large background database of information before the archaeological material could be examined. The problem is made worse by the lack of a precise local flint source to use as a control for the database construction. Furthermore, the variability inherent in the materials collectively termed 'bloodstone' makes the characterisation of this rock more difficult. The features initially noted as being indicative of bloodstone vary both in their frequency and in their visibility. Moreover, the alteration caused by weathering and abrasion on the archaeological artifacts compounded the problems of material identification to the extent that the analysis could not proceed without an examination of that alteration.

THE EXAMINATION OF SURFACE ALTERATION B FINLAYSON

The surface appearance of many of the artifacts shows considerable alteration when compared to the parent rock. In the commonest form of alteration the artifact turns a uniform white or cream colour, and the original hue only survives as a tiny central core. Both bloodstone and flint suffer from this type of alteration, but the change varies in degree throughout the assemblage, from pieces apparently 'mint fresh' to those that have lost surface texture, weight, and colour. In addition, the original variability in the native rock adds to the range of colour and texture present, and makes the separation of the different results of weathering difficult. This problem occurs throughout the spectrum of the bloodstone, as differing colours and textures apparently weather at different rates. It was therefore necessary to seek an explanation for the surface alteration, and to examine its varied nature, in order to be able to approach the task of distinguishing between the artifacts of flint and those of bloodstone.

METHOD

A programme of experiments was devised to look at the surface alteration. These were designed to examine the possible causes of the total alteration of the original surface texture together with the loss of weight that is described here as 'abraded'. The experiments included controlled heating (as in the heat treatment of flint for improved knapping properties; Griffiths *et al* 1987), burning, freezing, exposure to chemical attack by acid and alkaline solutions and mechanical abrasion. These treatments were carried out both in isolation and in combination. The precise methods, together with details of the results, are to be found in microfiche (Finlayson mf, 1:G1–G11). Whilst the tests cannot be regarded as replicating the effects of several thousand years of post depositional action, it was hoped that they might give some broad parameters to possible causes of the archaeologically observed surface alteration, as well as information on the original state and material of an altered piece. Most of the sample was bloodstone, with beach pebble flint from the Solway Firth and English chalk flint used as a control.

RESULTS

The programme of experiments failed to produce a totally abraded piece replicating those from the archaeological sample. The closest copies were made by combining heat, acid and mechanical abrasion, with heat apparently the most important element and abrasion the least. Individual size did not apparently affect variation of weathering. The principal cause of difference appeared to be the original textural variation. Despite its initial appearance, the coarse-grained bloodstone was not so prone to alter under any of the weathering processes as the finer-grained material. In addition, none of the bloodstone weathered as rapidly as the flint. However, against these general trends, some pieces of identical appearance, including some from the same block, did show variation in the rate of weathering, even under the same sequence of experimental events. Differences in the surrounding matrix (eg the depth of the piece in the experimental sand bath) may, in part, account for this, particularly in the case of burning, where fragments may have been located in different parts of the original block.

An interesting result of the experimental work was the light that it shed on the archaeological recognition of burnt pieces. The number of experimentally burnt pieces that showed the classic characteristics of burning, as used during classification on site (ie heat spalling, a colour change to white, and crazing) was surprisingly low. The highest proportion came from shattered pieces that had been heated to 600° C for 100 minutes and cooled rapidly. Even then, only 11% of these burnt pieces would have been identified using the on-site criteria (total sample = 1241). The 'burnt' pieces recognised during excavation must therefore be seen as a minimum quantity.

THE CHARACTERISATION OF THE RAW MATERIALS B FINLAYSON

In view of the technical problems involved in the identification of the raw material, it was decided to examine further the usefulness of hand inspection as a method of distinguishing bloodstone from flint. A list of visual attributes was drawn up which took into account the characteristics of surface alteration.

THE SELECTION OF ATTRIBUTES

After description each piece was assigned to a material, and a degree of certainty was given; pieces that could not be identified were classified as ambiguous. The attributes could then be assigned levels of significance. Some attributes were only associated with clearly identifiable examples of one of the two raw material types. Other attributes were less certainly associated, but in these cases the relative associations of the different attributes were of use. For example, the presence of fossils was taken to indicate flint; frequently associated with these fossils was a particular form of cortex (rounded and battered, typical of beach pebbles), and this cortex was never associated in the sample with any of those attributes distinctive of bloodstone. Pieces without fossils but with this cortex were therefore described as 'probably flint'. This identification was supported by the hypothesis that the bloodstone nodules collected from Guirdil beach were only slightly abraded, whilst the flint cortex was the result of prolonged battering. Out of the reference sample of bloodstone from Guirdil Beach only one piece showed any development of a heavily abraded cortex. Furthermore, these 'probably flint' pieces had a particular colour and texture of weathering which was never noted in conjunction with any evidence of bloodstone. Pieces with this colour alone, but with none of the other 'flint' attributes were therefore classified as 'possibly flint': 'possibly' because of the lack of other discriminating features and because the distinction between the various shades of colour in the assemblage was more difficult than the observation of discrete features.

The attributes selected are presented in tabular form (Finlayson mf, 1:G1●): several are those listed by Durant (Durant mf, 1:E10–F7).

THE CLASSIFICATION OF MATERIAL BY ATTRIBUTE

The attribute classification was tested on 64 freshly made pieces and applied to a sub-sample of 1600 of the archaeological pieces. From this a rapid sorting system was developed which, given the constraints of any visual examination of material, was considered to be acceptably accurate (Finlayson mf, 1:G1–G9). The isolation of significant attributes meant that a piece could be classified as soon as any one of these attributes was observed. In this way, three separate samples of the archaeological material were classified:

- the material from the 1984 wet-sieved sample-quadrats
- the material analysed for technological detail
- the modified artifacts.

DISCUSSION

Whilst this method is considered sufficient for the identification of the raw materials at Kinloch, alternative methods that would provide more absolute evidence do exist, but all have problems of expense and speed (see above). Now that a sample of the assemblage has been assigned to material categories it should be possible in future to use small sub-samples to test the accuracy of the groupings. In particular, both the 'probable' and the 'possible' categories are based on analogy with pieces of clearly identified material and it would be preferable if more certain methods could be employed. In addition, the processes of surface alteration and the lack of surface discriminating features have hindered visual identification.

RESULTS

THE PLOUGHSOIL SAMPLE: MATERIAL

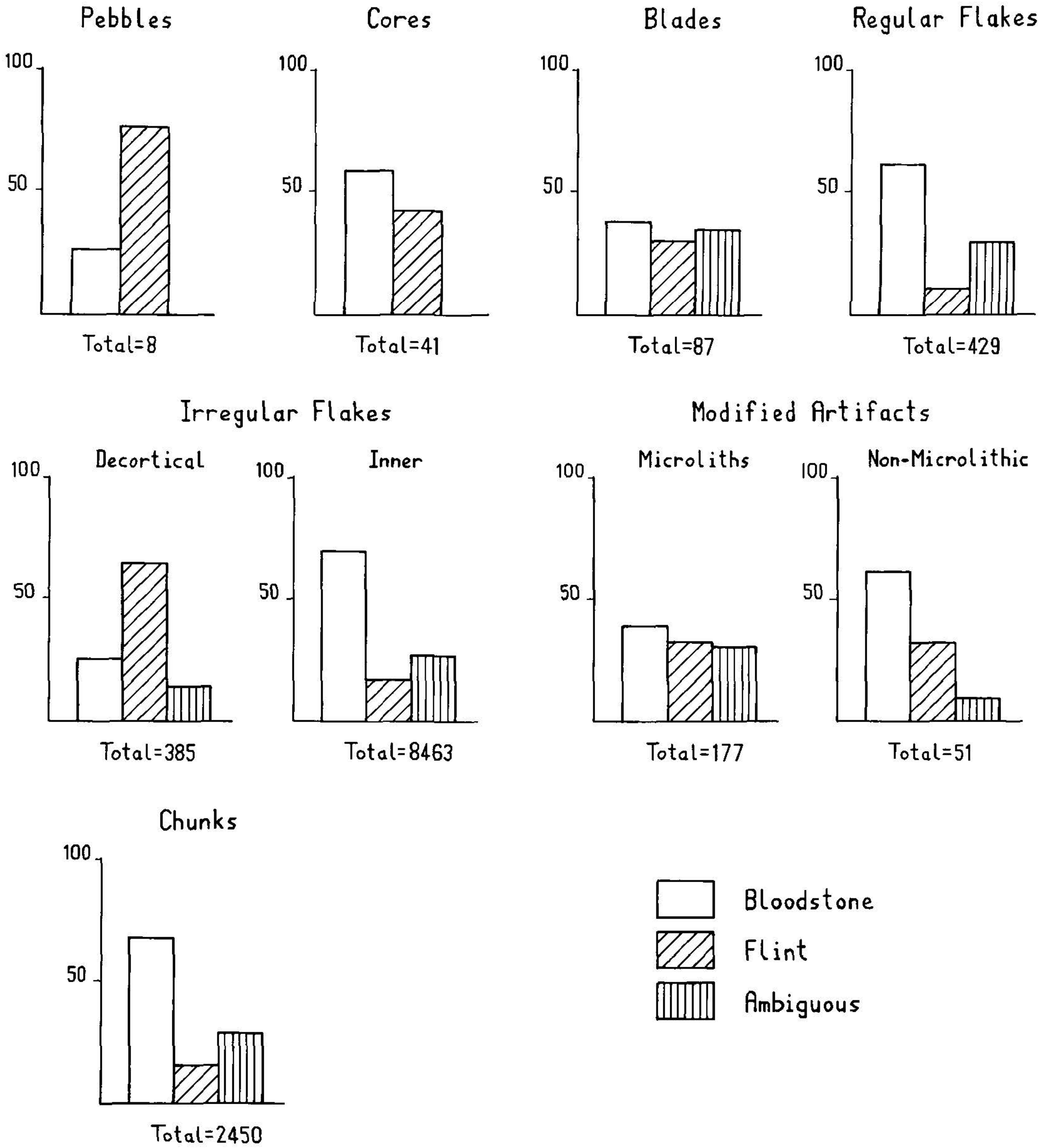
All the material from the 1984 wet-sieved sample-quadrats was classified into raw material categories. This comprised a total of 12,091 pieces of which 137 were neither flint nor bloodstone. Illustration 25 presents a breakdown of this sample by material. From this it is clear that the majority of the assemblage is of bloodstone, in certain categories, however, flint predominates. Amongst the irregular flakes, for example, over half of the inner pieces are of bloodstone, whereas 64% of the decortical pieces are of flint. Both blades and microliths are more often of flint and, although only eight pebbles were recovered, six are of flint. The other retouched artifacts, however, reflect the predominance of bloodstone in the sample. The relative abundance of decortical, irregular flakes of flint may reflect the fact that the presence of cortex aids the recognition of flint, but it is also likely that this reflects the differing reduction strategies used for the two materials (Chapter 6). The relative abundance of flint for blades and microliths is probably also a reflection of the exploitation of the different properties of flint by the prehistoric knappers (Chapter 6).

THE PLOUGHSOIL SAMPLE: BURNING

This analysis suggested that 8% of the sample was burnt, almost twice the number of pieces that were identified as burnt during the on-site classification. As the experimentation showed that many of the pieces subject to intense heat did not develop the classic signs of burning, this must be a minimum figure for the amount of burnt material in the assemblage. There was no evidence for the deliberate heating of material to improve its knapping qualities (Griffiths *et al* 1987). Almost half of the recognisably burnt material consisted of chunks, a strong indication that the fracturing of both bloodstone and flint on heating was a major factor in the formation of irregular material.

THE STRATIFIED SAMPLE: MATERIAL

The second sample studied was that given detailed consideration by the lithic technologist (Chapter 6), namely material from a secure mesolithic context and material from the mixed mesolithic/neolithic deposits. It consisted



ILL 25: The lithic assemblage from the ploughsoil sample, wet sieved quadrats: by type and material.

of 1708 pieces. The detailed results are presented in Chapter 6 with the discussion of the technology to which they relate, but in brief bloodstone was found to dominate, although the apparent superiority of flint for some artifact types (ie blades) was demonstrated. Overall, the highest proportion of flint came from the purely mesolithic assemblage.

THE MODIFIED ARTIFACTS: MATERIAL

All of the modified artifacts were classified by material. The results of this are presented with the discussion of the individual types (Chapter 7). In summary, those based on blade blanks show a dominance of flint, while those based on flake blanks are more likely to be made of bloodstone (Ills 52, 53).

DISCUSSION

It is evident that the two main materials in use for flaked stone tools were selected in different proportions for different purposes, but in no category was this carried out to the extent of excluding either material. At first sight, the use of any flint seems surprising, in view of the free availability of bloodstone on the island, but the flint was generally of better quality than the bloodstone, and thus more suited to the production of some of the artifacts (Chapter 6). The evidence indicates that a pebble source of flint was used (probably beach pebbles), but flint was clearly not as abundant as bloodstone. Both the flint and the bloodstone were locally available, and they were supplemented by a small quantity of other local siliceous rocks. It is clear that the prehistoric knappers made full use of the range of lithic resources of Rhum.