1. Introduction

The building stones of the Malverns are being studied as part of a 4½ year project aiming to trace buildings to their original source quarries.

The Malvern Hills are a form of upstanding, fault-bounded to the east, of Precambrian igneous rocks extending approximately 12km from north to south. The rock has been extensively quarried both for building stone and for aggregate until the mid 20th century. Much of the building in Malvern owes its character to the blocky building stones derives from the Malvern Complex and but little is known about the precise origins of this material.

2. Field Survey

There are two principle groups of building stones used on the Malvern Hills: Malverns Complex igneous rocks used as random rubble blockwork and a greenish grey fine grained sandstone, almost always used as well dressed ashlar, which is also relatively prevalent in the town. Buildings, particularly those using Malvern Stone also utilise Jurassic oolitic limestones for quoins, windows surrounds and other dressings for which the igneous rock is unsuited. A deep green, likely glaucophanic sandstone, is restricted in use to the church at Hollybush where it is used for the bulk of the construction. This bears a strong resemblance to the Cambrian Hollybush sandstone quarried just over a mile away in Hollybush Quarry.

The most abundant lithology in the Malverns Complex is diorite (Lambert and Holland 1971). In most quarries it is faulted against and intruded by multiple subordinate bodies of granite pegmatite, dolerite and rarer ultramafics.

Granite is only highly abundant in the Westminster Bank quarry in West Malvern so fieldwork has centred here as this gives us a recognisable traceable lithology with which to establish the degree of affinity the nearby buildings show to the stone in the quarry.

Several houses and walls in the region of the quarry are built almost exclusively from pink granite and can be concluded to have come from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the internal thicknesses of the walls.

Several quarries nearby, all of which contain predominantly granite, are built almost exclusively from a mixture of melanocratic and mesocratic diorites. In addition many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology. There are three other quarries nearby, all of which contain predominantly diorite. However many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology. There are three other quarries nearby, all of which contain predominantly diorite. However many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology. There are three other quarries nearby, all of which contain predominantly diorite. However many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology. There are three other quarries nearby, all of which contain predominantly diorite. However many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology. There are three other quarries nearby, all of which contain predominantly diorite. However many of the block surfaces in these buildings are characterised by intense epidote mineralisation which is all but absent from the Westminster Arms quarry. It does not seem likely these can have been sourced from that quarry given the very disparate lithology.

3. Documentary Sources

The identity of the ‘glauconitic sandstone is confirmed by documentary source (1) which states that stone from the Hollybush Quarry should be used. It seems that, originally, this was only to be for the internal thicknesses of the walls. Bennett (1948) states that quarries in the Ridgeway Cross area near Cradley supplied a greyish sandstone building stone which is “used for the construction of many of the houses in Malvern”. The prominence of this area to Malvern and the abundant use of the stone there, together with the close resemblance of the lithologies in quarries and buildings, combine to suggest beyond much doubt that if the sandstone in Malvern was all sourced from near Cradley. The quality of this stone begs the question of whether it was exported more widely in the area.

4. Historic Mapping

Ordinance Survey maps were produced of the area at regular intervals between about 1880 and 1920. By comparing the different map editions we are able to determine both which quarries were operational and which buildings were built ever pre 1880, or in the interval 1880-1920. In Great Malvern, on the east side of the hills the only nearby quarry by 1880 is Tank at the north end of the hills. It seems probably therefore that much of the building after that date used rock from that quarry on the east side of the hills.

We are also able to examine how various quarries developed over the years. This gives ample demonstration of the acceleration of quarrying in a small subset of quarries many of which continued to the 1960s.

5 Petrology and geochemistry

Three samples have been analysed by quantitative scanning electron microscopy to determine mineralogy, undertaken by Fugro-Robertson. The results of this confirm to some extent the notion that there is too much incoherent variation in the common diorites and granites to allow any diagnostic characteristic on the basis of mineralogy. Two samples analysed (14, 16) from quite different locations appear largely similar essentially confirming what might have been established in the field.

Ultrafamtic lithologies may be more productive. Lambey & Holland (1971) concluded that one variety of biotite-amphibolite was restricted only to the Tollgate Quarries. Our results (sample 15) show high proportions of pyroxene and actinolite.

The main powers of the conservators to bring about the cessation of quarrying weren’t passed until 1924. It is possible that pressure on the quarrying industry contributed to a shortage of stone. It is difficult to precisely state what might have been established in the field.

6 Temporal patterns

An interesting feature of the buildings built between 1880 and 1920 is that a comparatively large proportion of them are built from Cradley Stone in comparison to earlier periods. There are several possible reasons for this 1) changing fashions 2) changing availability of stone. It is difficult to precisely ascertain the cause but it is notable that the Malvern Hills Conservators were established in 1884 partly as a result of what many saw as the destruction of the hills by quarrying. It is possible that pressure on the quarrying industry contributed to a shortage of stone. The main powers of the conservators to bring about the cessation of quarrying weren’t passed until 1924. It seems therefore more likely that this transition was more driven by changing trends, perhaps influenced by some awareness that the use of Malvern stone was intrinsically tied to the exploitation of the hills.

7 Conclusions

- Combination of historical information and fieldwork can trace stone sources even though rocks are highly discordant in outcrop
- The addition of historical and documentary sources adds a powerful external constraint
- Geochemistry and petrology may help correlation
- A complex picture of patterns of quarrying and stone use is being built up

9 Acknowledgements

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10 References

(1) Registry of the Diocese of Worcester (1928) Parochial Box for All Saints, Hollybush, Diocese of Worcester, W.A.A.S.
(2) Bennett (1942) The geochemistry of Malvern, Malvern Naturalists’ Field Club.