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Summary

This report describes a lithological examination of the stones used to build the mediaeval chapel of St Giles Hospital near Brompton Bridge. A total of 1541 stones from the north, south, east and west elevations (inside and outside) were divided into five main lithological categories and mapped onto a scale drawing of the walls. The dominant components were sandstones, quartzites and limestones of local origin, the most probable source being the nearby riverbank and bed. The lithologies appear to be distributed almost randomly within and between the walls while the relation between clast size and lithology is that which would be expected in a natural, geological sample.

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INTRODUCTION

Archaeological excavations near Brompton Bridge during the summer of 1990 exposed the remains of St Giles Hospital, a complex of mediaeval buildings situated on a minor terrace of River Swale. The hospital chapel was located within the eastern half of the site and appeared to have been the first building that was constructed of stone. After it fell out of use, the chapel was buried to a depth of more than 1m by soil eroded from adjacent high ground. These conditions evidently favoured the preservation of this important building since, when excavated, the wall footings and several courses of stone were found to have survived intact. The aim of this study was to record the lithological components of the principal elevations and of the adjacent river gravels. These data might then assist in distinguishing phases of wall construction by identifying corresponding changes in composition.

METHODS

The base 'map' for this geological study was a set of preliminary drawings of the wall elevations to a scale of 1:20 and copies of these were used for locating and recording stone types on site. The first task was to quickly review the compositions of the facing and core material in order to establish lithological classes for recording the walls in sufficient detail. Owing to limited time, it was not possible to record shape indices for the stones although it was recognised that this information can help constrain possible sources of building material.

The lithologies were identified by simple visual examination, particularly of weathered surfaces, using a hand lens. Dilute hydrochloric acid was used to test for the presence of carbonate. As the survey progressed each stone was checked off with a chalk mark to ensure that all the recorded stones tallied with the drawing supplied. Nevertheless, some discrepancies were noted between the preliminary drawings and the actual walls, making it impossible to record the lithologies of a number of blocks. Stones smaller than about 3cm were not recorded. Finally, the composition of the cobbles eroded out of the river bank were also examined since these were seen as possible building material.

DESCRIPTIONS OF THE LITHOLOGIES

Referring to the coloured elevations on the drawing, the following lithologies were identified:

Sandstone

Within the chapel walls there are many varieties which are mainly separable on the basis of colour differences. However, most are fine-grained quartz arenites with buff, cream or salmon pink colours. Weathering often leads to a progressive reddening of these lithologies.

The cobbles and boulders often show rounded edges and vertices but the faces show greater control by bedding structures than in the sedimentary quartzite below. The separate classification of 'Quartzite' and 'Sandstone' imposed here is slightly artificial inasmuch as all types appear to be quartz cemented quartz arenites, only differing in the degree of cementation.

Sedimentary Quartzite

Seen as a buff coloured, very fine-grained quartz arenite. A high degree of cementation by silica makes this lithology extremely indurated and consequently cobbles and boulders of this rock type are generally well rounded. This also suggests fluvial transport.

'Grit'

Within this grouping the following two lithologies were identified but have not been distinguished on the drawing:

1 A gritty sandstone comprising a coarse to very coarse grained quartz arenite containing <=20% granule sized clasts of vein quartz.

2 A grit similar to that in (1) but containing a higher proportion of granule sized clasts.

Limestones

There are several types but these are not differentiated in the drawing.

1 Dark grey wackestone (ie. muddy limestone) containing comminuted shall fragments <=2mm across. Breaks with a sub-conchoidal fracture.

2 Heavily recrystallised packstone/grainstone (ie. grain supported limestone). Weathers light grey and occurs as flaggy clasts. Weathered surface shows abundant crinoidal debris. Original (mud?) matrix is now sparry and breaks to give a frosted surface.

3 Buff/cream bioclastic (predominantly crinoid) packstone containing disarticulated crinoid ossicles (<=3mm across). Original mud matrix seen.

Dolomite and Dolomitic Limestone

A buff coloured, highly friable rock giving a weak reaction with dilute HCL. Uncommon in the walls and river bank. Mechanically weak. Grouped on the drawing with the limestones described above.

Chert

This occurs largely as flaggy or slatey clasts. The thin form is a dark grey banded chert; chert streaks occur within impure limestones and impart a flaggy texture to the rock. Some clasts consist almost entirely of chert laminae and resemble 'ribbon cherts'. Far less common in this grouping are chert nodules which resemble flint but which are derived from the Carboniferous limestone.

DISCUSSION

Quite clearly, the dominant lithologies in the chapel walls are sandstones, quartzites and limestones (Table 1). Judging from their rounded appearance, all the quartzite and limestone building stones appear to have come from the river.

Some sandstone also seems to have come from this source. However, many of the more rectangular blocks (some of which show evidence of dressing) may have been quarried although perhaps not specifically for this building. Others might have been derived from colluvium since similar blocks are seen in the river bank section.

All lithologies with few exceptions appear to be locally derived and there is no evidence for specific transport of stone over distances greater than from the river or from the walls of ruined buildings similarly sourced.

The distribution of lithologies in the walls appears to reflect the selection of stones on the basis of their natural shapes and sizes. For example, large square sandstone or quartzite blocks have been used to build the corners. Rubble used to fill the core of the wall or the spaces between the facing stones is also drawn from these dominant lithologies. However, the smaller intervening clasts include a higher proportion of mechanically weak rock types the size of which is controlled by structure (jointing and bedding) such as banded cherts or even pieces of coal. Chert nodules, which are inherently small, were also used in this way.

E NORTH WALL EXTERIOR W

72·00

W NORTH WALL INTERIOR E

70·67 70·67

N WEST WALL EXTERIOR S

71·15

S EAST WALL EXTERIOR N

70·63

S WEST WALL INTERIOR N

70·84

N S EAST WALL INTERIOR

70·50

SCALE

1 0 1 2 3m

W SOUTH WALL EXTERIOR E

70·60 70·60

E SOUTH WALL INTERIOR W

70·67 1454 1489 1487 1513 1514 70·67

SANDSTONE QUARTZITE GRIT LIMESTONES CHERT

TABLE 1
Lithologies in the St Giles Hospital walls

WALL ELEV.	S	Q	G	L	D	C	TI	TU	CO	SL	?
N interior	230	67	2	64	2	5					
N exterior	177	146	6	60	5	17					
S interior	163	67	1	40	2	3	2	1			1
S exterior	131	61	2	31	1	8				1	
W interior	70	13		11	1						
W exterior	61	5	1	7					1		1
E interior	8	2		2							
E exterior	24	27		11							

KEY:

S = Sandstone
Q = Sedimentary quartzite
G = Grit
L = Limestone
D = Dolomite and dolomitic limestone
C = Chert
TI= Tile
TU= Tuff
CO= Coal
SL= Slate
? = Unidentifiable

Report compiled by: ..... and .....

Date: 28/4/91.....

APPENDIX A
LITHOLOGY OF DRESSED STONES

LARGE FRAGMENTS

Lithological group

A	SN23/406	Fine to medium grained, slightly micaceous quartz arenite (ie. quartz sandstone).
	423/SN36	"
	1112/SN37	"
	423/SN35	"
	1047/SN34	"
	1058	"
	171/SN33	"
	1060/SN24	"
	212/SN49	"
	1117/SN14	"
	547/SN9	"
	SN22	"
	503/SN38	" (reddened & blackened)
	SN8	"
	1006/SN32	"
	1186/SN6	"
	506/SN5?	"
	427/SN43?	"
	427/SN51	"
	814/SN52	"
	197	"
	1058/SN47	"
	?/SN16	"
	1058/SN46	"
	427/SN48	"
	289	"
	1008/SN1	"
	1006/SN44	"
	1117/SN12	"
	1101/SN21	"
	1117/SN11	"
	1117/SN13	"
	1117/SN15	"
	1101/SN21B	"
	1061/SN18	"
	1014/SN20	"
	1014/SN19	"
B	1217?/SN7	Medium to coarse grained quartz arenite which is more indurated and 'gritty' than lithology A.
C	1006/SN40	As lithology A but more micaceous
D	470	Salmon pink fine grained quartz arenite which is very s oft and crumbly; 3 parts of a hearth.
E	SN31	Fine-grained buff coloured quartz arenite.
	764	"
	547/SN26A	"
	599/SN26B	"
F	650/SN25	(Sedimentary) quartzite.
	/SN27	"
G	BSG2107	Mid to dark grey fissile siltstone

H	1047/SN17	Very coarse grained quartz arenite containing granule-sized clasts of vein quartz ('grit').
	1032/SN28	"
	1624/AA (part of quernstone)	"
	1615/AA (part of quernstone)	"
I	165/SN29	Clean, medium-grained quartz arenite.
J	723/SN45	Mid grey bioclastic packstone/wackestone (ie. limestone) with chert streaks.
	727/SN39	"
	1021/SN10	"
K	3008/SN4	Highly weathered crinoidal grainstone (limestone).

SMALL FRAGMENTS

Lithological group

A	0168	Flaggy dark grey siltstone with chert streaks. Many brachiopod moulds.
	0122	"
	0182	"
	0193	"
	0108	"
	0120 (2 pcs)	Flaggy wackestone (ie. muddy limestone) with dark grey chert streaks.
	0163	Slaty mid grey bioclastic (predominantly crinoidal) wackestone. Rather dirty, silty matrix shows weak reaction with dilute HCL. Fissile, breaks into c. 0.5cm thick 'slates'.
	0137	"
	0146	"
	1622	"
	1611	"
	1152 (2 pcs)	"
	1014	"
	1157	"
	699	"
	1040	"
	1012	"
	409	"
	404	"
B	0164	Red-stained crinoidal packstone (limestone). Coarsly flaggy.
	0120 (2 pcs)	"
	759 (2 pcs)	"
	1045	"
	430	"
	411/AK	"
C	0138	Iron-stained fine-grained quartz sandstone.
	0283 (pot lid)	Arenite composed predominantly of lithic clasts.
	0259	Fine to very fine grained quartz arenite (sedimentary quartzite).
	0182	Fine-grained quartz arenite.
	0182	Dark grey chert.
	0171	Fine to medium-grained quartz arenite.
	1044	"
	0109	"
	0313	Fine-grained quartz arenite.
	0165 (tessera?)	Dark purple/red fine siltstone.
	0195	Dark/mid grey vesicular lava (basaltic andesite?)/ Augite predominant; some partial vesicle fillings (amygdales of calcite).
	42200 (sculpt.)	Fine to medium-grained quartz arenite.
D	1609	Light grey, iron-stained, bioclastic (crinoidal) wackestone (ie. limestone).
E	1619/AA(pot lid)	Fine to medium-grained, flaggy, micaceous quartz arenite.
	1010/AA(pot lid)	" (partly polished)
	1010/AB(pot lid)	"

F	1619/AC(pot lid)	Fine-grained, flaggy slightly micaceous quartz arenite.
G	1018/AB/SN31	Very fine-grained, pale grey highly weathered wackestone.
H	1654/AA	Very fine-grained, pale buff limestone (chalk).
	002 (tessera)	"