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# KENTISH RAG AND OTHER KENT BUILDING STONES

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The name Kentish Rag, or Ragstone, suggests a building stone suitable only for rough walling purposes, a view expressed, for example, by Howe (1910, 264), who wrote of Kentish Rag: 'It has been extensively used in churches in the Home Counties in the form of random and coursed work; it cannot be dressed . . .' From earlier periods than Howe's time of writing there are, however, many examples of dressed stonework as well as of ashlar and window tracery in Kentish Rag. It is one purpose of this paper to draw attention to the varied ways in which the stone has been used from time to time.

Kentish Rag varies in lithology along its outcrop, such that it is possible in the case of many buildings to deduce the location from which their stone has been derived. Certain Middlesex churches (Robinson and Worssam 1990) provide instances. The paper, therefore, starts with an account of the geology of Kentish Rag. Descriptions are also included of three types of stone with some resemblance to Kentish Rag: the well-known Reigate stone, from Surrey; Folkestone stone, which is rarely recognised as a building stone; and Thanet Beds sandstone from east Kent, so little regarded that it has no familiar local name.

## THE GEOLOGY OF KENTISH BUILDING STONES

Kentish Rag occurs in the Hythe Beds formation, which is part of the Lower Greensand, a group of formations of Lower Cretaceous age (see Table 1). The ragstone is a hard sandy limestone, consisting of rounded detrital grains of quartz and of the green mineral glauconite, cemented by calcite (a crystalline form of calcium carbonate). Analyses of the rock show around 85 per cent  $\text{CaCO}_3$ . The ragstone occurs in layers from 0.10 m. up to about 0.90 m. thick, interbedded with layers of hassock, a loamy, calcareous, glauconitic sand. Such alternation, to a

total thickness, depending on locality, of about 10 to 40 m., makes up the Hythe Beds formation in Kent, almost to the Surrey border. Farther west, and throughout Surrey, the Hythe Beds consist of non-calcareous sandstones. Ragstone and hassock occur in the Hythe Beds in Sussex from Pulborough eastwards to near Ditchling (see White 1924), but the stone there is thought to have been used only locally for building.

Within both rag and hassock can occur layers of chert, a very hard, splintery stone, grey when fresh, and brownish-grey when weathered. It resembles flint in being composed essentially of silica.

In buildings, particularly in west Kent and in the London area, Kentish Rag is perhaps most likely to be confused with Reigate stone. Both are grey and finely glauconitic. But whereas Kentish Rag is from the Lower Greensand, Reigate stone comes from the Upper Greensand formation of Surrey. It is only slightly, or not at all, calcareous, is composed largely of particles of amorphous silica and is slightly micaceous. The absence of rounded quartz grains and the presence of scattered mica flakes serve to distinguish it from Kentish Rag (these features are best observed using a hand lens). Weathered blocks of Reigate stone commonly show a dished surface, as of stone softer than its mortar joints; those of Kentish Rag, on the other hand, tend to flake around their edges and so develop a convex profile.

In east Kent the sands of the Folkestone Beds formation, within the Lower Greensand, include, from the coast inland for some 10 km. as far as Stanford, beds of a hard, grey, glauconitic calcareous sandstone, much of it gritty to pebbly (i.e. including rounded quartz grains of 2 mm. up to 5 mm. in diameter, and easily visible to the naked eye), and some of it cherty. The stone superficially resembles Kentish Rag, but is more sandy. In historical records the term 'Folkestone stone' may include both Folkestone Beds sandstone and Kentish Rag, for both were won from foreshore outcrops in the manor of Folkestone, between Folkestone harbour and Sandgate. It is recommended that the term Folkestone stone now be used only for stone derived from the Folkestone Beds.

A third type of stone that may be mistaken for Kentish Rag is pale-grey, fine-grained calcareous sandstone from the Thanet Beds formation. Geologically this is restricted to east Kent eastwards of Faversham. It is rarely exposed inland, but crops out as lines of ovoid round masses or doggers, up to about 0.30 m. thick, in the sands that form cliffs between Herne Bay and Reculver (Holmes 1981) and on the north side of Pegwell Bay. At both places blocks of the stone litter the foreshore. Another outcrop is on the river-cliff, now overgrown, forming the east side of Richborough Castle. The stone is finely glauconitic. It differs from Reigate stone in that it contains quartz grains. Its essential difference from Kentish Rag is that it tends to be

laminated, such that, when weathered, the stone splits along flat bedding planes 1 cm. or less apart.

#### DETAILED GEOLOGY OF KENTISH RAG

The outcrop of the Hythe Beds in Kent (Fig. 1) forms a south-facing escarpment, the Chartland (of Everitt 1986), extending from the coast at Sandgate westwards via Ashford, Maidstone and Sevenoaks. This tract of high relief comprises three sectors, each characterised by strata of different type.

The first sector extends from Sandgate to near Boughton Malherbe. The outcrop, though attaining 110 m. (350 ft.) O.D. at Lympne and Pluckley, forms mostly but a low range of hills, and the scarp crest follows a sinuous course. The port of Hythe, until blocked by shingle in the sixteenth century, would have been well placed to ship ragstone from quarries above the town.

In the second sector, from Boughton Malherbe to near Mereworth, the scarp crest takes on a straight course a little north of west, with a height around 120 m. (400 ft.) O.D. This sector, centred on Maidstone, with the River Medway traversing it and facilitating transport of stone, has always been important for quarrying. In the third sector, from Mereworth to near Westerham, and centred on Sevenoaks, the scarp crest is still a well-marked feature, and behind it is a tract of varied relief, including one of the highest summits of the Weald, of 240 m. (800 ft.) O.D. at Toys Hill.

In the middle sector the Hythe Beds succession is known in detail. Until the 1950s Maidstone quarrymen had names for most of the ragstone beds. They also had their own word, 'lane', for bed in the geological sense. With increasing mechanisation the use of bed names has died out in the quarries, but the names, recorded in the Maidstone Memoir (Worssam 1963), remain of value as a basis for geological correlation. The succession can be summarised as consisting of a lower part, up to a bed of cherty limestone known as the Flint (see Fig. 2), in which rag and hassock beds are well defined and constant in thickness and maintain their individual characters over wide areas; and of an upper part in which ragstone beds are more uniform in lithology, but tend to be discontinuous, and to include seams and lenses of chert.

The names given to beds differed slightly from quarry to quarry, and more so between two main groups of quarries, those around Maidstone and those at Boughton Quarries, a hamlet south by east of Maidstone. Some are quite descriptive. Thus, in the 1950s at Coombe Quarry, just south of Maidstone, a hassock underlying the Flint lane, and in which ragstone occurs only as lenticular masses or doggers, was known as the



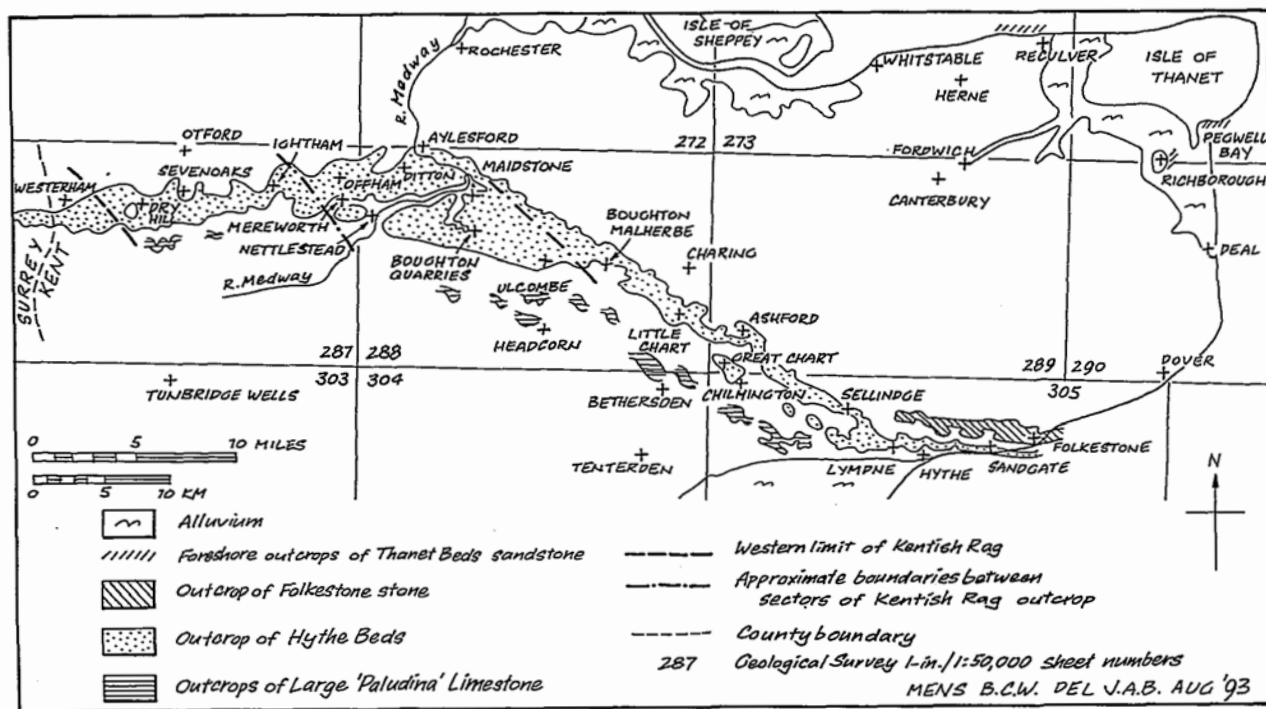


Fig. 1. Locality map, showing also outcrops of formations yielding building stone.

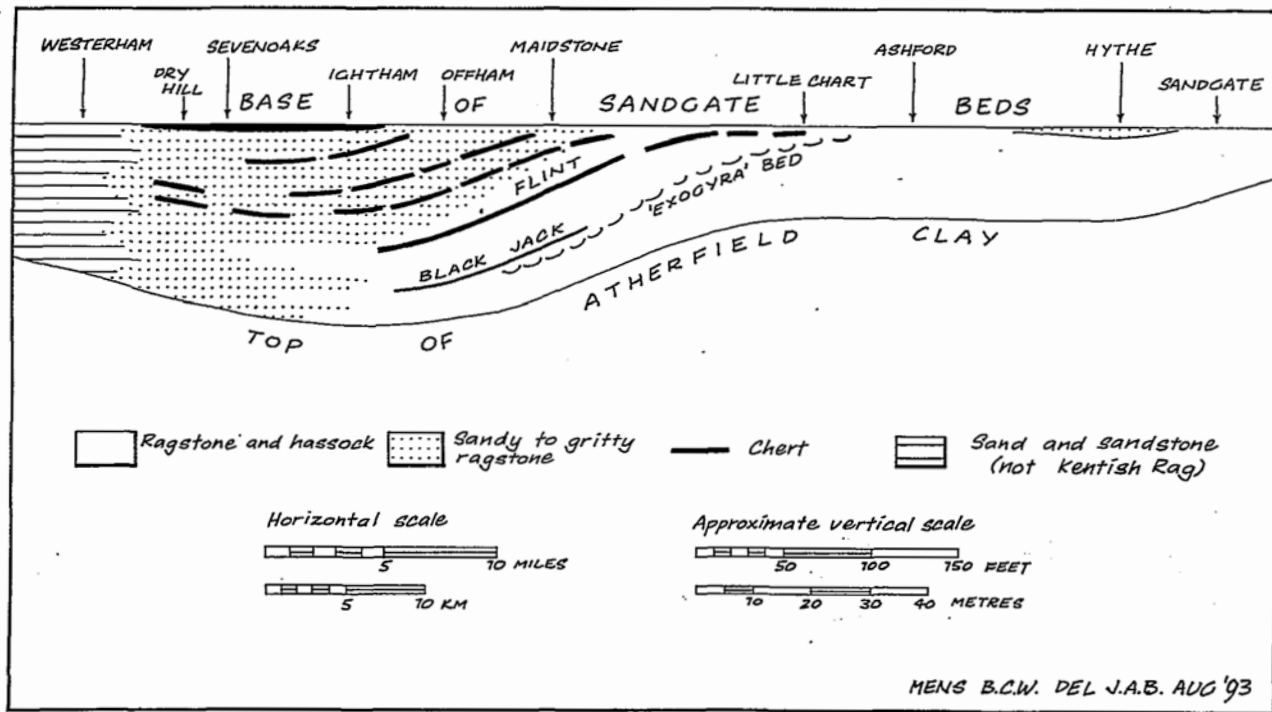


Fig. 2. Diagrammatic vertical section to show varying constitution of the Hythe Beds formation along the outcrop in Kent.



(*British Geological Survey photograph A8816*).  
Quarry 275 m. north of Brishing Court, Boughton Quarries, in 1952.

Chance, and below that in turn came the White, a light-coloured limestone, and the Coalman, a dark grey limestone said to have derived its name from lines of dark brown charcoal-like spots, actually soft phosphatic nodules, in the hassocks above and below it. At Boughton Quarries, the Flint was known as the Coalman and the Chance seems to have died out, while a light-coloured limestone equivalent to the White was known as the Ragstone, and the equivalent of Combe Quarry's Coalman was the Newington.

That these Boughton names are of some antiquity is shown by the close resemblance of those in use in 1950, in a quarry 275 m. (300 yds.) north of Brishing Court (Worssam 1963, 39), to those in two nineteenth-century accounts, one anonymous (1839), the other by John Whichcord junior (1846) (see Plate I and Table 2). The latter author, himself an architect, was the son of John Whichcord, a successful Maidstone architect. Whichcord (1846) described the Whiteland Bridge as one of the best beds in the quarries. A free-working bed, 14 in. thick, blocks of it 12 ft. long could be obtained 'of almost any width required, as the fissures in the regular beds usually arrange themselves in squares; forming, as it were, so many tables of stone . . .'. While the

principal beds worked in the 1839 and 1846 quarries must have been the same as those seen in 1950, one has an impression that the 1839 list is from a quarry that went rather deeper than that of 1846, while the 1950 quarry went a little higher in the succession than the earlier ones.

The transition from the strata that make up the succession near Maidstone to those to the west is brought by the upper beds of the formation becoming increasingly sandy (see Fig. 2). A large quarry at Borough Green, near Ightham, formerly showed (Worssam 1970) in the upper half of its face many beds of coarsely sandy to gritty ragstone, some including glauconite grains of 2 mm. diameter. Finer-grained limestones, like those so well developed near Maidstone, were to be seen only near the bottom of the face.

From Ightham westwards beyond Sevenoaks (Dines *et al.* 1969) chert occurs at the top of the Hythe Beds, in layers up to 0.30 m. thick, forming a unit up to 4 to 5 m. thick known as the Sevenoaks Stone. The presence of this very hard rock probably accounts in part for the high relief of the escarpment thereabouts. Of the many quarries that must once have existed around Sevenoaks only one remains, at Dryhill, near Sundridge, preserved as a County Council picnic site. The Sevenoaks Stone is there 2.40 m. thick. Below it a little chert occurs in some finely sandy rag and hassock beds, while the lowest beds exposed are of coarsely sandy to gritty ragstone and hassock.

Ragstone is not recorded west of Brasted. Stone formerly quarried in the vicinity of Westerham, near Hosey Hill and Limpsfield Common (Dines *et al.* 1969, 68), is a yellowish sandstone with more resemblance to Hythe Beds sandstones near Pulborough and Midhurst in west Sussex than to Kentish Rag.

The boundary between the Hythe Beds succession in the Maidstone area and that in the easternmost sector of the Hythe Beds outcrop is taken at the top of the 'Exogyra' Bed (Fig. 2), a whitish sandy or gritty limestone crowded with shells of a small variety of the oyster-like 'Exogyra', a fossil now known as *Aetostreon*. This bed may have been that at the very bottom of the Boughton quarries as seen by Whichcord (1846), and termed by him White Rag – 'useless, tumbles to pieces on exposure to the air'. In recent years, the quarries have shown it just below a distinctive dark grey limestone, the Black Jack, itself the lowest well-marked Hythe Beds limestone immediately west of Maidstone. Eastwards from Maidstone, the 'Exogyra' Bed rises higher in the succession, until at Little Chart and at the Goldwell quarry, near Great Chart, it occurs near the top of the Hythe Beds, with beneath it quite different rag and hassock strata from those near Maidstone. These beds persist eastwards to the coast. They include no chert, and the ragstone beds are mostly fine-grained and of a pale grey colour, with little difference in texture from one bed to the next. Bed names, such as

Square Rock and Little Diamonds, were found to be in use in one quarry in the 1950s, at Chilmington Green, but no bed sufficiently distinguishable to be traced for any distance could be recognised. Within some of the limestones occur the shells of fossil brachiopods – *Sellithyris sella* and *Sulchirhynchia hythensis*, commonly in small clusters or ‘nests’. At the top of the succession from Sellindge eastwards to Hythe, where they are best developed (Smart *et al.* 1966, 52), occur one or more beds of a dark green, hard and tough glauconitic limestone.

An account of the fossils of the Hythe Beds was given by Casey (1961). Shells are most common in the hassock beds. They are sparse in ragstone of the western and central sectors of the outcrop. Most often to be seen in building stone from those parts of Kent are cross-sections of large shells, some 150 mm. across, of *Aetostreon*. Trace-fossils, notably infilled burrows 10 to 20 mm. or so in diameter, show up on some weathered surfaces, of stone from all parts of the outcrop.

### *Summary of Geology*

The lateral variation in stone type of the Hythe Beds of Kent is shown diagrammatically in Fig. 2. To summarise the main features of Kentish Rag as seen in buildings:

- (1) Stone from the westernmost part of the outcrop is likely to be coarsely sandy or gritty, with glauconite grains up to 2 mm. in diameter, and to include patches of chert; this stone, used in and around Sevenoaks, tends to develop a greenish-brown colour on weathering;
- (2) Ragstone from the Maidstone area is generally of a medium grey colour; it may include chert, but coarse sand grains are absent (their most easterly occurrence is in a quarry at Ditton); small brown phosphatic nodules occur in some beds; particularly good stone, in large blocks, came from Boughton Quarries;
- (3) Stone from the easternmost part of the outcrop should be recognisable by its pale grey colour and absence of coarse sand grains and of chert, and particularly by the presence in it of brachiopod shells – seen in cross-section these are ovoid and about 20 mm. in length.; the dark green sandy limestone from the Sellindge to Hythe vicinity is quite distinctive.

In east Kent buildings, grey, coarse to gritty stone with patches of chert is likely to be Folkestone stone. It will be noted that some ragstone from the Sevenoaks area answers to the same description. Both, probably because of the abundance of glauconite, tend to weather to a

brownish colour, though no Kentish Rag has the conspicuous quartz pebbles seen in some Folkestone stone. The two types of stone seem to have been used mainly in the vicinity of their respective outcrops: if, however, they were exported on any scale to more distant locations, say Essex or Hertfordshire, they might be difficult to tell apart.

#### QUARRYING PRACTICE

Kentish Rag is worked in open quarries, some of which in recent years, worked for roadstone, have been very large. The hassock is largely a waste material, back-filled into worked-out parts of the quarries. Near Maidstone, at Willington (Worssam 1963, 38) and on the south side of Mote Park, are some small stone mines, of probable nineteenth-century date, made by driving horizontal galleries into steep valley sides, but these are exceptional.

According to Whichcord (1846) some hassock beds provided building stone. The only such use of hassock known to the writers is for walling of a farm outbuilding, rather derelict in 1989, beside the lane through Boughton Quarries hamlet. The stone, in squared blocks, includes some phosphatic nodules, and could be Whichcord's 'Best Hassock', from just above the Newington lane.

The existence of quite deep quarries near Maidstone in Roman times is suggested by hassock from a 1988 excavation in Lothbury in the City of London. The stone, which came from the foundations of a second-century town house (information from Dr P. Rowsome, of the Museum of London), contains numerous fossils including crushed Trigoniids, and is of a type found only immediately above the Black Jack, normally the lowest ragstone bed of Maidstone quarries.

The Museum of London has on display part of a sailing barge that was wrecked at Blackfriars in the second century A.D. with part of its Kentish Rag cargo intact (Marsden 1967). Borings by the brackish to marine worm *Teredo* in the barge planking could have been acquired in the Thames estuary on voyages between Maidstone and London.

It is borings into the ragstone itself that have provided an unexpected insight into past quarrying practice. In 1990, one of us (T.W.T. T-B.) noticed that some blocks of Kentish Rag in the quoins of the late twelfth-century tower of St. Nicholas's Hospital chapel at Harbledown, 3 km. west of Canterbury, show recent marine bivalve borings, some enclosing intact shells. Since then, similar borings have been noted in quoins of the thirteenth-century chancel of Paddlesworth church, near Folkestone, and in Kentish Rag stonework of the late fourteenth-century rebuilding of the Poor Priests' Hospital in Stour Street, Canterbury, as well as at other places.

On being shown shells extracted from borings at the Harbledown chapel, Dr J. Taylor, of the British Museum (Natural History), London, identified them as *Hiatella arctica* (Linnaeus). Some of the stones at Harbledown and the Poor Priests' Hospital bear slot-like incisions about 2 mm. long, recognised by Dr Taylor as bored by the Polychaete worm, *Polydora*. These stones must, therefore, have been quarried from a foreshore, the only possible location for which is where the Hythe Beds outcrop comes down to sea level, from Sandgate eastwards to within 1 km. or so of Folkestone. The type of stone used in the buildings cited, a light grey limestone with brachiopods, is what would be expected at Sandgate. The beds are exposed at low tide, forming a wave-cut platform at the foot of the shingle beach. A visit to the outcrop in February 1992 confirmed the presence, in loose boulders of Kentish Rag, of borings containing *Hiatella* shells, and also of *Polydora* borings.

These observations throw light on historical accounts that imply large-scale foreshore quarrying in the Folkestone vicinity, while buildings referred to in the accounts show that it was not only the Hythe Beds outcrop that was worked (for Kentish Rag) but also that of the Folkestone Beds, in the area of what is now Folkestone Harbour, for Folkestone stone. Thus, there was quarrying at Folkestone in the early thirteenth century for stone for Dover Castle, and in 1362–65 for a new castle (Queenborough, now demolished) at Sheppey (Salzman 1952, 128–9). At Dover Castle, brown-weathered, gritty Folkestone stone predominates in thirteenth-century walls, and some of the blocks, in the facing of the Colton Tower and the Constable's Tower, show mollusc borings. Light grey Kentish Rag limestone occurs in minor proportion.

Foreshore quarrying is described in an account of the building of Sandgate Castle (Rutton 1893), where in 1539 men were engaged 'in carrying stone, not only in lading of carts but also wading in the water for to lade the boats, giving attendance on the tides, and waiting on the carts'. The walls of the castle are as much of Folkestone stone as of Kentish Rag. Some Kentish Rag blocks in the rubble core of broken-down parts of the walls are certainly beach-boulders, riddled with mollusc borings.

The construction of Dover Harbour in the sixteenth century, of which a graphic account has been provided by Martin Biddle (1982), involved the transport of large quantities of stone from the Folkestone foreshore. In about 1535, 'huge stones as laie on the shore, neere the low watermark (where the quarrie or mine of those rocks is)' were attached by chains to large barrels, which, floating as the tide rose, lifted the stones so that they could be towed by small boats to Dover – a device that so pleased Henry VIII that he awarded a pension to the Dover

fisherman who invented it (Rutton 1893). The 'huge stones' are more likely to have been doggers of Folkestone Beds sandstone, freed from their enclosing sands by wave action, than blocks of Kentish Rag, which would have needed quarrying to separate them from their interbedded hassock.

Later in the century, quarrying is suggested by a record of repairs to Wye church tower after a lightning strike in 1572, when £20 was spent on 'quoyne stone' from Folkestone, including 4s. 'laid out when we went to Folkstone to remove the stones that were hewn and lay in the sea' and 5s. 'for a carriage to remove the stones to the fourth sea mark' (Hubbard 1951). Rutton (1893) referred to a map of 1725 in the British Museum showing quarries on the foreshore, one 600 yds. (550 m.) west, the other 990 yds. (820 m.) east of Sandgate Castle; these, he thought, implied eighteenth-century working of the stone. The former quarry certainly, and the latter probably, would have been on the Hythe Beds outcrop.

In the foreshore exposures at Sandgate, the beds have a more or less steep landward dip, caused by landslipping of the Hythe Beds over the underlying Atherfield Clay. The flat surface of the outcrop now has no sign of any depression that looks at all like a quarry, and Topley (1875, 316) may well have been right in suggesting that removal of rock from the foreshore here, by unloading the toe of old slips, caused renewed slipping on land. This in turn would have brought fresh rock above sea-level offshore. Landslips on this stretch of coast attracted the attention of Sackete (1716) and King (1786). The former author referred to a 'Mooring-Rock' reputed to have existed for at least forty years, at which vessels were moored 'while they were loading other Rocks'. It had disappeared by King's (1786) time of writing. The 'subsidence of ground' described by the latter, which resulted in rocks appearing offshore as a reef just off the entrance to Folkestone harbour, seems to have been an arcuate slip of Folkestone Beds over Sandgate Beds clays.

The Thanet Beds sandstone in buildings was in all probability obtained only from foreshore outcrops. Some blocks of this, too, show *Hiatella* borings, first brought to our attention in 1988 by Dr Eric Robinson in early Norman rubblework of St. Augustine's Abbey, but since then seen at many other localities.

#### USE OF KENTISH RAG AT DIFFERENT PERIODS

As a very durable building stone, readily available, Kentish Rag was widely used in south-east England from Roman times until the early twentieth century. Though the difficulty of working the stone must always have been apparent, there were times when masons attained



such levels of skill as largely to overcome even this disadvantage. The following account gives instances of use at successive periods, drawing attention in particular to locations where the provenance of the stone has been referred to or can be inferred from its lithology. Examples of the use of Folkestone stone and of Thanet Beds sandstone are also included.

### *Roman*

Dark green glauconitic sandy limestone from near Hythe was much used by the Romans where massive stonework was required. It was employed, among other types of stone, in the construction of the great triumphal arch at their port of *Rutupiae* (now Richborough Castle) in A.D. 85. In the late third century it was used for jambs of all the city gates of Canterbury, e.g. Worthgate, Ridingate (Blockley 1990) and Queningate. The last-mentioned, blocked up in the fifteenth century, is still to be seen in the city wall. The foundations of the main (west) gateway of the Saxon Shore fort at Richborough Castle (late third century) are of massive blocks of the same stone, re-used from the monumental arch.

The light grey Kentish Rag in the footings of the late first-century bath house at Little Chart (Eames 1958) was probably quarried nearby. The walls were faced with carefully squared blocks averaging 10 x 15 x 12.5 cm. – an early example of ‘dimension stone.’

It was probably Maidstone Kentish Rag that was used for the Roman city walls of Rochester and London, the latter built about A.D. 200, possibly (Blagg 1990, 39) at Imperial expense. Kentish Rag was used in the countryside, too, e.g. in the construction of the villa at Eccles. The walls of the Saxon Shore fort at Lympne (Stutfall Castle) are of Kentish Rag, probably from a quarry near the scarp crest immediately above the fort (Hutchinson *et al.* 1985).

Part of the Canterbury city wall (late third century), now forming the north nave wall of St. Mary Northgate, is faced with rounded beach boulders of flint and of a gritty calcareous sandstone with chert streaks. The latter is Folkestone Beds sandstone, otherwise rarely seen in Canterbury.

Much Thanet Beds sandstone was used by the Romans for rubble walling of Richborough Castle, and some appears in the remaining walls of Reculver Saxon Shore fort.

### *Anglo-Saxon*

At St. Mary-in-Castro, Dover (late tenth to early eleventh century), the basal courses of the south wall of the nave and of the south transept are

of beach-boulders of gritty brown calcareous Folkestone stone; higher parts of the walls are of flint rubble, probably a nineteenth-century re-facing.

A large grave-slab with a runic inscription from the site of St. Peter's church, Dover (Haigh 1872), now in the Dover Museum, is of dark greenish grey sandy limestone of the type occurring at the top of the Hythe Beds at Hythe. Massive squared blocks of the same type of stone, re-used from Roman remains, occur in the quoins of St. Mildred's and St. Dunstan's churches, Canterbury (Worssam and Tatton-Brown 1990).

The Anglo-Saxons used quantities of Thanet Beds sandstone for the rubble walling of their earliest stone buildings in east Kent, as at St. Martin's church, Canterbury (Tatton-Brown 1980), and Reculver church, where the nave north wall is mostly of this sandstone with a little Roman brick and a few flint cobbles. Excavation of the nave floor of Canterbury Cathedral in March 1993 showed that a sleeper-wall along the line of the north arcade of Archbishop Lanfranc's cathedral nave of 1070-77 was built of a variety of re-used stone blocks from its late Anglo-Saxon predecessor. Some Marquise stone and Quarr stone were included, but most numerous were blocks of laminated, grey Thanet Beds sandstone, some with *Hiatella* borings, and one of them a rounded beach-boulder.

#### *Later eleventh century and twelfth century*

In London, the most prominent Norman use of Kentish Rag was for the rubble walling of the White Tower of the Tower of London (late eleventh century). It has outlasted the Caen and Quarr stone of quoins and doorway and window surrounds, which were largely replaced externally by Portland stone in the eighteenth century.

In Canterbury, much of the early Norman rubble work is of flint and Thanet Beds sandstone. This can be seen particularly well at the early Norman castle keep. However, large squared blocks of Kentish Rag, with chamfered top edges, are visible in the plinth of early Norman (late eleventh century) parts of St. Augustine's Abbey and Canterbury Cathedral. At Rochester large quantities of Kentish Rag were used for the castle keep and for 'Gundulf's Tower' (the bell tower of the cathedral), both built in the twelfth century. Ragstone was also seen in the foundations of the original west front of the cathedral (Livett 1889).

The Norman (twelfth-century) west doorway of Harrow church, Middlesex, has Kentish Rag outer attached shafts, bonded into Reigate stone inner jambs. An adjacent clasping buttress, presumed also to be Norman, is in part of Kentish Rag, of Boughton Quarries type (Robinson and Worssam 1990, Fig. 4).

In country churches in west Kent and along the Chart ridge during the later eleventh and twelfth centuries Kentish Rag was used mainly for rubble walling, at first with tufa, and later with Caen or Reigate stone quoins. Instances are Otham church (late eleventh century) and the chancel of St. Peter-ad-Vincula, Ditton, with tufa quoins; and Newlands chapel, near Charing (c. 1180), with Caen stone dressings. In the thirteenth century ragstone came into use for side-alternate quoins and simple jambs, though chancel lancet windows of this date, as at Otham and Ulcombe, and along the Thames estuary littoral, can be of Reigate stone. The widespread use of Kentish Rag for tracery, etc., began only in the early fourteenth century.

### *Thirteenth century*

The use of Folkestone stone and Kentish Rag in thirteenth-century walls at Dover Castle has been mentioned above (p. 102). Royal accounts document the carriage of stone by sea from Folkestone, as many as 397 boatloads arriving in 1227 (Colvin 1971, 64–5).

In the mid-thirteenth century the establishment of a quay at New Hythe, on the left bank of the Medway downstream from Maidstone, must have facilitated the shipment of stone from an area west of Maidstone, around West Malling.

At the Tower of London, major late thirteenth-century works were the construction of new curtain walls and their towers, mainly of Kentish Rag, with Bembridge limestone, from the Isle of Wight, as a lesser constituent. Accounts of 1278 record that 304 shiploads of 'grey stone of Aylesford' and three shiploads of 'freestone from Folkestone' were brought in. The latter is perhaps the fine-grained limestone with brachiopods, to be seen in the basal courses of the south-east turret of St. Thomas's Tower (Tatton-Brown 1991). In addition, many shiploads of '*grisa petra*' (which must be ragstone, some of it indeed coming from Aylesford) were taken to Westminster Palace in the thirteenth century (Colvin 1971, 328–9, 344–5, 356–7).

Kentish Rag was used for thirteenth-century windows at Salmestone Grange, in the Isle of Thanet (Archibald 1934, 30 and Fig. 33). At St. Radigund's Abbey, near Dover, a small pointed archway from the nave into the tower shows an effective combination of Kentish Rag soffit and Caen stone hood moulding. The ragstone is a light grey limestone with a few, possibly brachiopod, shell remains and in all likelihood is from east Kent. It has a bold sunk quadrant chamfer, while by contrast the softer Caen stone hood is deeply undercut.

Thanet Beds sandstone continued to be used for rubble stonework in east Kent in the thirteenth century: at Minster-in-Thamet church the walls of the chancel are of approximately 25 per cent sandstone, 75 per cent flint.

*Fourteenth century*

In the fourteenth century there was a sudden expansion in the use throughout the south-east of Kentish Rag for carved window heads, moulded jambs, mullions, etc. Richard Hussey (in Larking 1859, 112, footnote) remarked that the medieval practice was to carve mullions, etc., at the quarry; and that when some old quarries at Dean Street, East Farleigh (in the Medway valley upstream from Maidstone) were opened in 1859, several fragments of finished stonework were found, such as parts of a Holy Water stoup, arched mouldings and cusps of windows. Newman (1980) described the nave arcades of Pluckley and Bethersden churches as standard work of the fourteenth century. These arcades, as well as those at Great Chart and Headcorn, have identical octagonal columns, of a pale grey fine-grained ragstone characterised by burrows of 2 cm. in diameter inclined at a slight angle to the bedding. This stone could have come from quarries at Great Chart or Chilmington.

In the fourteenth and fifteenth centuries Kentish Rag and Large-'*Paludina*' limestone were used side by side in the tract where the Chartland borders the Low Weald. At Headcorn the capitals of the Kentish Rag columns of the nave arcade, and the outer mouldings of the arcade arches, are of Large-'*Paludina*' limestone. This is the Weald Clay limestone commonly known in Kent as Bethersden Marble, but which has outcrops near Headcorn (Fig. 1) quite as extensive as those near Bethersden. Ulcombe church, on the Hythe Beds scarp crest, has a south window to its chancel with early fourteenth-century split-cusp tracery in Large-'*Paludina*' limestone; and a north window with tracery of a very early Perpendicular style (before 1350) in Kentish Rag, but with mullions and sill of Large-'*Paludina*' limestone.

The accounts for the repair of Rochester Castle in 1367 to 1369 (Larking 1859) list numerous types of ready-worked Kentish Rag supplied by Boughton Quarries. There was '*scuassheler*,' for instance, perhaps meaning skew ashlar, or squared stones with one face sloping. These, presumably, were used for the sloping plinth, or batter, still to be seen at the foot of each of two towers on the east curtain wall of the castle. A common term in the accounts, '*urnel*', probably refers to roughly squared blocks. At 6s. per hundred feet, this type of stone was cheaper than both *scuassheler* (20s. per hundred) and '*squarassheler*' (16s. per hundred). In 1362, at Boughton Quarries (Salzman 1952) the charge for scappling *urnel* was  $\frac{3}{4}d.$  a foot, as against  $2\frac{1}{2}d.$  for '*tables*' (horizontal mouldings such as string-courses) and  $4d.$  for jamb-stones. *Urnel* was listed (Salzman 1952, 129) among stone from Maidstone supplied to the Tower of London in 1338 and 1349. Later in the century Maidstone *urnel* was used at Westminster; at Leeds Castle; in 1375

(together with ashlar) for a new chapel at Havering; and in 1397 for paving at Eltham.

The Jewel Tower at Westminster is a near-complete building of the mid-fourteenth century, almost wholly, except for its early eighteenth-century Portland stone window surrounds and brick parapet, of Kentish Rag. The stone is light grey and finely glauconitic. The tower was designed by Henry Yevele for Edward III in 1364–66, and the accounts for its construction show that 8107 ft. of ashlar and 5675 ft. of urnell – ‘a more roughly dressed stone’ – were obtained from Maidstone (Taylor 1965). Of L-shaped plan, the tower’s outward-facing walls, rising from a little moat, are of ashlar, while those that originally faced inwards towards the Westminster Palace garden are of coursed rubble, presumably the ‘urnell’.

In Canterbury, Kentish Rag ashlar was used for buttresses on the south side of the cathedral nave, rebuilt in 1377–82, and for the Westgate of the city (1380). Both employ blocks which are long (up to 1 m.) relative to their height (around 0.20 m.). The stone has few distinctive features, but its general appearance tends to suggest Maidstone quarries. Fourteenth-century ragstone from east Kent is to be seen in many east Kent churches, e.g. those at Minster and Monkton, Thanet, both having buttresses and quoins of a pale grey fine-grained limestone with numerous thin-shelled fossils and small *Aetostreon*. The bored stone at the Poor Priests’ Hospital in Canterbury (south wall of former chapel and east wall of hall) has already been mentioned.

As well as its use in plinths, buttresses and quoins, Kentish Rag was favoured for corbels and for the ‘headers’ used to reinforce stone walls. At the new College of St. George in Windsor Castle, during the 1350s rebuilding, the main building stone was Reigate stone, but in April 1353 the accounts mention ‘one hundred stones called corbels, each containing 3½ feet’ (at 2d. a foot) shipped from Maidstone. More stone was brought from Maidstone to London and on to Windsor in May 1353 (Hope 1913, 146). In London, a contract of 1389 documents the building of Tower Wharf with walls 8 ft. thick at the base, and faced in ‘ashlar of Kentish Rag’; at every 10 ft. a long ‘end-stone’ (i.e. header) was to be inserted (Salzman 1952, 469). And in Canterbury the northern city walls were refaced in the 1390s with knapped flint, etc., but at every few feet long headers of Kentish Rag were put in to tie back the face: this is best seen in the public garden immediately west of St. Mary Northgate church.

Maidstone parish church and the adjacent College for twelve priests, both of 1395–96 (Newman 1980, 404), provide a good example of late fourteenth-century Kentish Rag masonry. The walling of the church and its tower are of coursed rubble, with large ashlar blocks reserved for buttresses. Caen stone was brought into use for the nave and



*(Tim Tatton-Brown)*

Poor Priests' Hospital, Canterbury, detail of Ragstone masonry of the late fourteenth century in the lowest part of the solar undercroft east wall.



*(Bernard Worssam)*

Nettlestead church, north side of nave, built in 1420–30, entirely of Kentish Rag.

chancel arcades, for the ribs of the unfinished vaulting of the south porch, and as far as can be seen for a main feature of the church, its large aisle windows, though these have needed much repair, mainly carried out in Bath stone. The College externally is wholly of Kentish Rag, the imposing double entrance arch of its gate tower making use of very large stone blocks, with included phosphatic nodules that indicate a local origin.

The extent to which Kentish Rag was used for churches in Essex during the fourteenth and fifteenth centuries would constitute a subject in itself. As an example, at Tolleshunt D'Arcy the tower, the nave and the south porch of the church, all fourteenth century, are almost entirely of a light grey, finely glauconitic Kentish Rag. Exceptions are that the tower has a west window with reticulate tracery of Caen stone, and that the rubble walling of the nave includes some septarian nodules from the local London Clay. The walls of the chancel (early fifteenth century) are coated with rendering, but one original window is of Kentish Rag.

The fourteenth-century chancel of Hackington church, just north of Canterbury, has on its south side a plinth course of Kentish Rag with mollusc borings, and therefore shipped from Sandgate, and buttresses with quoins of green glauconitic ragstone from Hythe; while on its north side the buttress quoins are of a pebbly sandstone with chert bands which must be Folkestone stone, unusually, for this stone, dressed as ashlar.

The great west tower of Herne church is unusual in showing, alternately with bands of knapped flints, courses of Thanet Beds sandstone dressed as ashlar, and bearing close enough resemblance to Kentish Rag to have been mistaken for the latter by Newman (1983). The near-contemporary tower of St. Nicholas-at-Wade shows a similar employment of Thanet Beds sandstone; its buttress quoins are of fossiliferous east Kent Kentish Rag. A new south-west tower was also projected, but never built at the neighbouring church of All Saints, Birchington when its nave arcades were being rebuilt in the 1340s. A now-lost indenture of 1343 specifies the building of 'four arches, three whole pillars and two pilasters with their capitals, all of stone from Folkestone, at the south side of the church . . . after the design of the pillars and arches on the north side of the church of blessed Nicholas atte Wade and also with sub-bases disposed as is usual between the same with buttresses to said continued work on the west side' (transcribed by C. Cotton in Coles 1950).

### *Fifteenth century*

Folkestone stone from foreshore outcrops continued in use in the fifteenth century. The Roman brick and tufa ashlar of the Pharos in



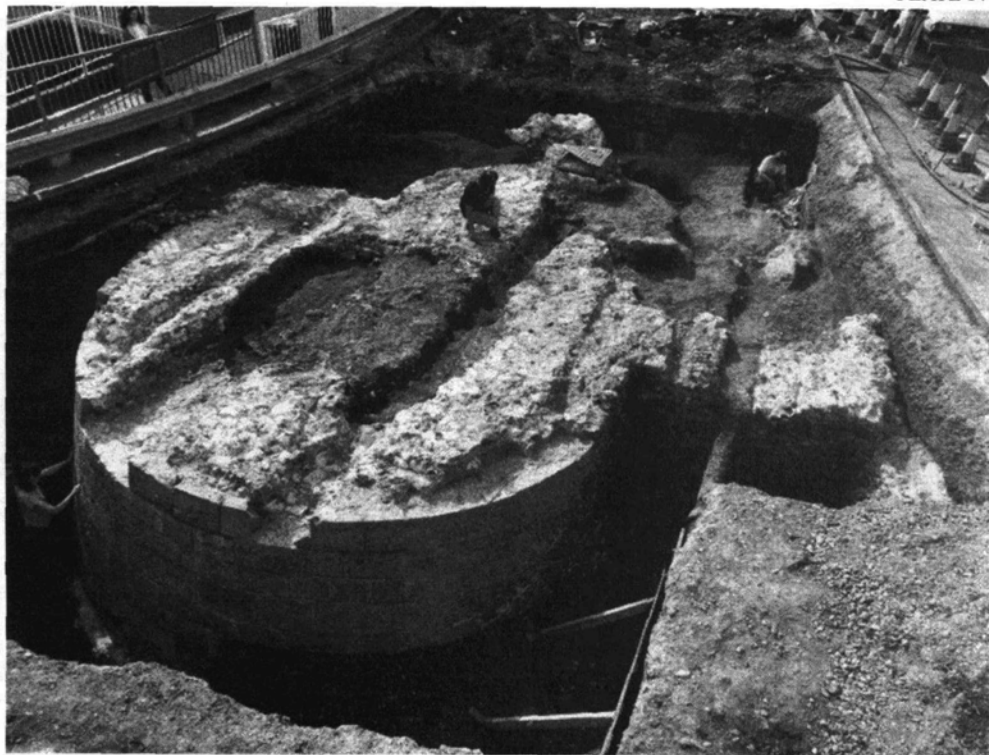
Dover Castle shows patches of refacing with small squared blocks of Folkestone Beds sandstone, some of them with mollusc borings. The refacing probably took place when a top stage was added to the tower in 1415–37 (Wheeler 1930).

The fifteenth century was the heyday for the use of high-quality Kentish Rag in Kent, London and neighbouring counties. Salzman (1952, 123) commented that the increasing custom in that century of buying stock mouldings from the quarry would help to account for the lack of individuality of many Perpendicular churches. An exception to this custom is, however, indicated by a 1442 contract with five quarrymen in Kent for the supply of stone to Eton College (Salzman 1952, 123, 515–56), which stipulated that the stone should be carved according to moulds delivered to them. And the nave and chancel of Nettlestead church, of 1420–30 and 1438, respectively, are wholly of Kentish Rag, and constructed with a high level of skill so as to show their stained glass (much of which remains) to the best effect. Livett 1909 commented that, viewed externally, the nave, with its tall and well-proportioned windows and the fine intervening buttresses, presents a design which is not commonly seen in churches built on so small a scale (Plate III).

In Middlesex and south Hertfordshire Kentish Rag was widely used, in combination with local types of stone, in the construction of fifteenth-century church towers. In addition to those at Harlington, Pinner and Stanmore (Robinson and Worssam 1990), there is Aldenham church tower, near Watford. This has walls mostly of flint rubble, but buttresses of more careful construction, faced with squared flints and local 'puddingstone', and with quoins of a fine-grained Kentish Rag, with phosphatic nodules, probably from near Maidstone.

The fifteenth century was also the great age of tower building in Kent. In the High Weald, Hastings Beds sandstones were employed, and in the eastern Low Weald (at Tenterden, Biddenden, Smarden and Headcorn) are towers of 'Bethersden Marble' ashlar, but elsewhere Kentish Rag was used; even where, in the north of the county, flint was the main facing material Kentish Rag was almost invariably used for quoins. Charing church tower, 'among the most ambitious in Kent' (Newman 1983), was built between 1479 and 1537, of stone probably from Little Chart or Great Chart. Its west and south walls are of evenly-sized blocks, and the courses in the diagonal buttresses are in line with those in the walls. Its north and east walls, less in public view, are of smaller, more roughly finished blocks, with slightly wider mortar joints that were later galleted.

In the Canterbury city walls, much use was made of ragstone ashlar for the late fourteenth and fifteenth century plinth and new towers. This can still be well seen in the two fine late fifteenth-century semi-circular



*(Canterbury Archaeological Trust)*  
South tower of St. George's Gate, Canterbury (excavated 1988), showing Ragstone ashlar plinth of 1483.



BERNARD C. WORSSAM and TIM TATTON-BROWN

*(Canterbury Archaeological Trust)*  
Detail of tooling and mason's mark on a block in the plinth of St. George's Gate, Canterbury

towers north of Burgate. The recently-excavated semi-circular tower at 16 Pound Lane (Tatton-Brown 1977) and the plinths at la Pound Lane (Anderson 1989) and of St. George's Gate (Bennett and Houlston 1989; Tatton-Brown 1989) showed a very high quality cut and tooled ashlar, that at St. George's Gate (Plates IV and V) recorded as coming from Maidstone in 1483, imported through Whitstable. Ashlar and 'ornell' supplied to Sandwich in 1463 may have been for the town gates there.

### *Sixteenth century*

Church-tower building and enlargement of churches continued into the pre-Reformation years of the sixteenth century. The tower of St. Mary Magdalen in Canterbury was rebuilt in c. 1503, its street frontage (to the north) faced with ragstone ashlar. The stone is in blocks up to 1.10 m. long, much like those used for the Cathedral buttresses over a century earlier, though on this fairly small tower they look over-sized.

The south aisle of Otford church (1520–30) has walls of ragstone blocks, some with conspicuous coarse glauconite grains and cherty patches that indicate derivation from nearby Sevenoaks. Some very large blocks, irregularly shaped and 0.50 m. or more across, are apparently face-bedded, but seem not to have suffered unduly from weathering as a result.

In London some fine ragstone ashlar was used for the great gatehouse of St. John's Priory in Clerkenwell, built in 1504. The stone is of a grey colour, and looked at closely is seen to be sprinkled with fine (0.20 mm. diameter) glauconite grains. Conspicuous in the lower stage of the gatehouse are large blocks of this stone, of similar dimensions to those used for the St. Mary Magdalen tower in Canterbury. Ragstone in similar large blocks is to be seen in the crypt of St. Bride, Fleet Street. The stone there was re-used by Sir Christopher Wren, after the destruction of the medieval church in the Great Fire of 1666, for a foundation wall on the east side of his new steeple. It was brought to light by archaeological excavation after the second gutting of the church in a 1940 air raid (Grimes 1968). The stone can be presumed to have been part of a late medieval tower, the position and date of which (Gustav Milne, personal communication, January 1993) are still matters of conjecture.

On the north side of Charterhouse Square, an outer wall and gateway, both probably of sixteenth-century date, remain of the London Charterhouse. The gateway is a four-centred arch of finely wrought Kentish Rag ashlar. The wall has a bold chequerwork facing, comprising 45 cm. (1 ft. 6 in.) squares alternately of coursed ragstone blocks and knapped flints. The ragstone contains many chert bands. It

probably came from Maidstone, and would have been suitable only for walling.

The Folkestone stone and Kentish Rag of Sandgate Castle, built in 1539–40, have been mentioned on an earlier page. The walls of the castle also include scattered squared blocks of re-used Caen stone, from St. Radigund's Abbey and elsewhere (Rutton 1893). The contemporary Deal Castle has walls faced with squared blocks of Folkestone stone, Kentish Rag and re-used Caen stone, roughly in proportions of 70, 20 and 10 per cent. Some of the Folkestone stone and Kentish Rag blocks show mollusc borings.

A later fortification, its stonework almost wholly Kentish Rag, was Upnor Castle, on the River Medway, built in 1559–67 and enlarged in 1599–1601. Some ashlar came from Boughton, but much of the stone for the castle came from the demolition of parts of Rochester Castle (Saunders 1985).

Fordwich Town Hall, built shortly before 1544, is notable for its timber framing; its ground floor, originally open, is now walled in, in part with large squared blocks of Folkestone stone.

### *Seventeenth century*

The seventeenth century must have seen a great decline in demand for Kentish Rag. Brick was in fashion for domestic architecture, while Portland stone came into use for public buildings in London. A minor use was for gravestones – Otford church has some large Kentish Rag ledger stones dated 1625, 1626 and 1635, and smaller ones of 1705 and 1715, but Portland stone, introduced there in 1697, replaced Kentish Rag in the eighteenth century.

Sackete (1716) recorded that stone quarried on the Folkestone foreshore had been shipped to Dunkirk in the time of the Commonwealth for harbour works, and that stone from the same source had been used, nearer his time of writing, for Dover pier and other pier heads.

### *Eighteenth century*

Some eighteenth-century ragstone masonry displays a high level of skill. An instance is Sevenoaks School, built in 1724–34 to the designs of Lord Burlington. The walling stones, in smallish blocks, with joints galleted, have flat, slightly roughened surfaces, but an ashlar finish was given to door and window surrounds and other architectural details. Chert patches and scattered coarse glauconite grains in some of the stone indicate an origin in nearby quarries.

Another distinguished Kentish Rag building is Mereworth church



*(Bernard Worssam)*

The Manor House, High Street, Sevenoaks, of about 1800. The front elevation is of Kentish Rag ashlar.

(Newman 1980, 421), one of the few eighteenth-century churches in Kent, of 1744–46. Its architect is unknown. The western or entrance side and the north wall of the church, facing the public highway, are of Kentish Rag ashlar blocks 7 to 8 in. in height, giving two courses to each of the large Tunbridge Wells sandstone quoin stones. Stone of less regular sizes was used on the east and south walls. The stone is of a uniformly grey colour. It could have come from the lower beds of Boughton Quarries, or from some working between there and Mereworth. In any case a large quarry is indicated, to have provided so much evenly-dimensioned stone.

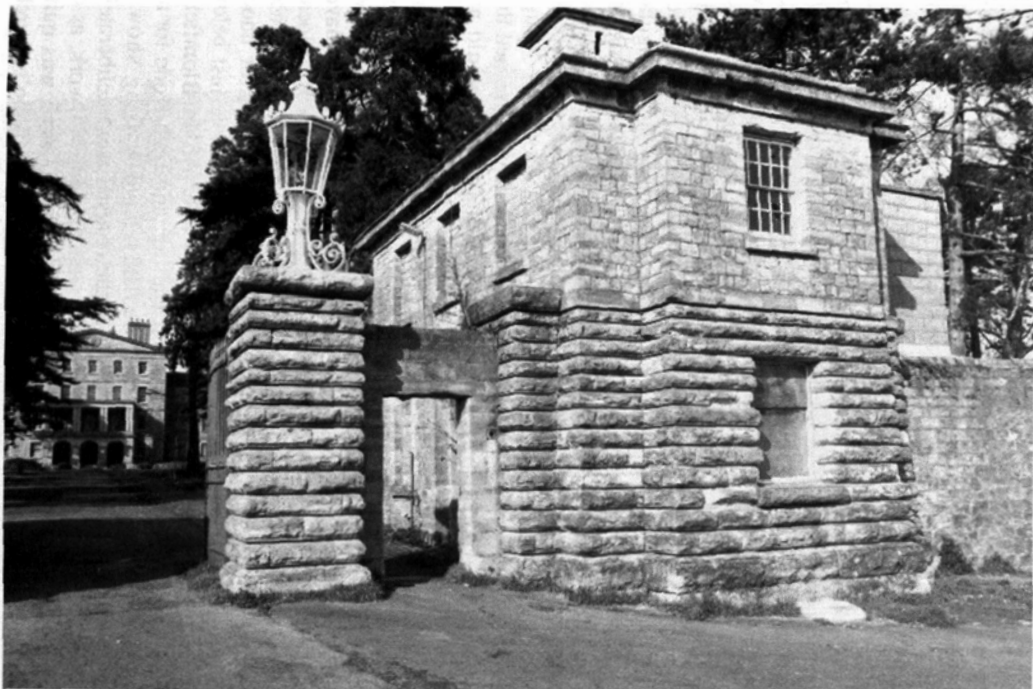
The Manor House, High Street, Sevenoaks, of about 1800 (Newman 1980, 514), may be cited as a typical example, for its period, of fine Kentish Rag ashlar, at least for the street frontage – the side elevations, equally visible from the street, are of rubble stonework.

### *Nineteenth and twentieth centuries*

In the early years of the nineteenth century Kentish Rag was widely used for public buildings in Kent. Maidstone Gaol, 1811–19, with its massive perimeter wall of Kentish Rag ashlar, with rusticated plinth and buttresses, is one example. Another is Barming Heath Asylum, now Oakwood Hospital, designed by John Whichcord senior (1830). And fine ashlar masonry is to be seen in the piers of Thomas Telford's (1829) Loose Viaduct, which carries the Maidstone-Cranbrook road over the Loose valley.

Evidence for quarrying in east Kent is provided by a note in the Canterbury Cathedral Chapter minutes of 1834, in which the woodreeve and surveyor, Mr Lake, was instructed to negotiate the digging of stone on the chapter's estate at Great Chart. In Canterbury the old Police Station, now the Music School, was built about 1840, in a Gothic style to fit in with the neighbouring medieval Westgate. Its yellow brick walls have ashlar quoins of Kentish Rag, of light grey east Kent type.

With the coming of the mainline railways, from 1842 onwards, freestones such as Bath stone became widely available – already in the later 1830s, however, 300 tons per week of Caen stone were imported to Canterbury (to rebuild the cathedral's north-west tower) via the new Whitstable harbour and the Canterbury and Whitstable railway, which was opened in 1830. Kentish Rag from the mid-nineteenth century onwards became regarded primarily as a rubble walling stone. Fortunately, a record of quarrying and building practice from the time when ragstone still ranked as a building stone of high quality survives in John Whichcord junior's (1846) *Observations on Kentish Ragstone as a Building Material*, a privately printed version of a paper read by



Gateway to Barming Heath Asylum (Oakwood Hospital), near Maidstone, by John Whichcord senior, 1830. *(B.C. Worssam)*



the author at the Royal Institute of British Architects. As well as an account of the succession at Boughton Quarries, referred to above (p. 98), the work includes detailed stonework specifications for Holy Trinity Church, Maidstone (built 1826) and Platt church, near Ightham (1842).

In quarrying, according to this author, it was usual to remove the less valuable layers by blasting with gunpowder. Quarries were worked so as to expose the upper surface of each of the more valuable beds in different places. The larger blocks of superior quality, known as ashlar, were, for economy in transport, usually reduced as nearly as possible to the required dimensions. Because the blocks could not be sawn, the process, known as 'skiffling', was performed with a heavy double-pointed hammer. In using ashlar, care was required to have the stone laid upon its natural bed. The blocks for door and window jambs and mullions needed to be set on end, but as the thickness required was not great it could be got from the heart of the stone. In contrast to ashlar, 'headers' were stones worked without much attention to beds and joints, to give one face square or rectangular, and the sides often receding at an acute angle so as to bring the stones, when laid, to a closer joint. Headers were laid in coursed, random coursed (levelled out in a rough manner at every foot or 16 in. in height), or random header work. In the cheapest, 'rough random' work, the expense of heading was saved. It was stressed that stones should be laid in ragstone mortar, as chalk lime would not adhere to the ragstone.

Changes in Kentish Rag usage during the nineteenth century are shown by Riverhead church, near Sevenoaks. Its tower and nave by Decimus Burton, 1831, in a lancet style (Newman 1980, 469), have rough random walling, coursed header plinth and parapet to the nave, and ashlar window jambs and buttresses. All this stonework is of local, coarsely sandy to gritty Kentish Rag. Tunbridge Wells sandstone was brought into use for the elaborately carved west doorway, for hood-mouldings and sills to the windows, and for a bold cornice just below the parapet. In 1882, the chancel was rebuilt, by Sir Arthur Blomfield, who used Kentish Rag only for random walling, and Bath stone for all dressings. Whereas the stones of the 1831 nave walling show a tendency to diagonal alignment, those of the chancel were deliberately laid so, giving an effect, unlike anything seen in medieval work, as of vertical crazy-paving. This type of diagonal random work was quite common in the later part of the nineteenth century – St. John's church, Sevenoaks (1858–59), provides another example – and its use continued into the present century, as shown by two barrack blocks in Dover Castle, one of 1868 (with Bath stone dressings), the other of 1913 (with Portland stone dressings). 'Random coursed' walling of



(B.C. Worssam)

Church of St. Mary-the-Virgin, Riverhead, south side. The nave, to the left, by Decimus Burton, 1831; chancel and vestry, to the right, by Sir Arthur Blomfield, 1882.

Kentish Rag, along with Bath, Caen, or other stone dressings, was, however, also common in the same period. Instances in Sevenoaks are the Vine Baptist church (1887) and the Methodist church, The Drive (1904).

In the nineteenth century, indeed, although the tradition of finer workmanship in Kentish Rag was lost sight of, as the quotation from Howe (1910) at the beginning of this paper shows, the use of the stone expanded greatly. Topley (1875, 375) gave a list, originally published by Papworth (1858), of thirty-three Kentish Rag churches with Caen, Bath or other stone dressings, built in London and its suburbs between 1841 and 1858. In Kent the stone is ubiquitous in nineteenth-century suburban houses, schools, farm buildings, bridge abutments, retaining walls, river and sea walls, and so on.

In the present century the use of Kentish Rag for building has inevitably declined drastically. Some recent instances of its employment are the use in about 1980 of stone from Offham Quarry for the facing of retaining walls of the pedestrian underpasses to the roundabout at the east end of the Medway bridge in Maidstone; the restoration in 1986 by John Bysouth Ltd. (masons) of the fourteenth-century tracery of first-floor chapel windows at Eastbridge Hospital in the High Street, Canterbury; and, in Essex, the new (1991) Roman Catholic Cathedral in Brentwood, designed in classical style by Quinlan Terry, with Kentish Rag walling to match the stonework of its Gothic Revival predecessor of 1861.

The Kentish Rag used in 1992–93 by stonemason Ray Gammon-Hardaway for facing the retaining wall along the riverside walk east of the Medway in Maidstone is from two different quarries. The wall, for 300 m. northwards from Earl Street to the railway bridge, comprises ten large panels between concrete uprights. The five southern panels are of stone from Stangate Quarry, the last remaining of once extensive Ightham quarries. The most northerly panel is of stone from the Hermitage Lane Quarry, Barming, opened only in 1990, while intervening panels show a mixture of stone from the two quarries. Stone from the Hermitage Lane quarry has also been used for repairs to East Farleigh church, near Maidstone.

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KENTISH RAG AND OTHER KENT BUILDING STONES

TABLE 1

*Summary of the Cretaceous geological succession in Kent*

Period	Group	Formation	Approx. thickness (m.)	Main lithology in Kent
Palaeogene	'Lower London Tertiaries'	London Clay	120	clay
		Oldhaven Beds	8	sand and pebble-beds
		Woolwich Beds	8	sand and clay
		Thanet Beds	30	sand
Upper Cretaceous	Chalk		200	chalk and flints
Lower Cretaceous	Gault	Upper Greensand	0-5	sand
		Gault	60	clay
	Lower Greensand	Folkestone Beds	60	sand
		Sandgate Beds	5-30	clay
		Hythe Beds	30	rag and hassock
		Atherfield Clay	5-20	clay
		Weald Clay	200	clay
	Wealden	Hastings Beds	300	sandstones and clays

TABLE 2

*Ragstone bed names at Boughton Quarries*

Anon., 1839	Whichcord 1846	Names in use in 1950
Land Rag	Land Rag	Robin
Yellow Rag	Header Laying	Green Rag
Green Rag	Green Rag	Thin
Pelsey	Yellow Rag	Potlids
Colemans	Pelsea	Toughy
	Coleman	Pelsey
	Little Coleman	Coalman
Great Rag	Great Rag	Ragstone
Newington	Newington Cleaves	Newington
Whitland Bridge (the best)	Flinty Laying	
Main Bridge	Whitland Bridge	Whitland Bridge
Garroll	Mainbridge	Main
Horsebridge	Garl	Girl
Bottom Lane	Horsebridge	
Second Bottom Lane	Headstone Laying	Bottom Lanes
2 or 3 lanes called Hoistings, some of which are more or less joined	Header Laying	
2 or 3 thin lanes	Header Laying	
Several lanes called Black Greys	Upper Bottom Laying	
	Under Bottom Laying	
	White Rag	

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