Rock around the town:
A guide to the geology around Faringdon and its influence on the character of the town.

by

N.J.Snelling

Faringdon is built on an ancient coral reef formed about 150 million years ago during the time known as the Jurassic when this part of England was situated at the latitude of the present day Mediterranean. Much of the town is actually built of these rocks and sometimes coral fossils can be seen in the house walls! This example, from a house wall in Lechlade Rd., is of a 'colonial coral' about 300 mm in size.

Frontispiece

After the coral reef (on which much of Faringdon is now built) emerged from beneath the sea it was submerged again at the beginning of the Cretaceous time about 145 million years ago. The sand and gravel deposited at this time on the sea floor is famous for the many fossils it yields. Fossil sponges are particularly common, but not the type we use in our baths. The little sponge creatures live in a 'nest' made of limestone as illustrated in this photograph.

Forward

Faringdon is situated near the southern limit of a low ridge of honey coloured limestone (commonly known as the Golden Ridge)which extends from Wheatley, on the outskirts of Oxford, towards Swindon. It is a quintessential English country town, formerly an important market and transit centre and with a history extending back well over a thousand years. The town was badly damaged during the Civil War (1642-46) and has been largely rebuilt since then, much of it from local stone although in Victorian times bricks began to come into use. Following the Civil War 'slates' from nearby Stonefield began to make their appearance and rapidly spread throughout the Cotswold towns and along the Golden Ridge as far as Faringdon, replacing the original thatched roofs, though here and there such roofs are still to be found. The coming of the railways also bought some Welsh slates into the area.

The limestone of the Golden Ridge is of Jurassic age and part of the Corallian Formation. As the name suggests it is rich in fossil corals and was deposited in a warm, clear sea, about 155 million years ago, when the British Isles were significantly further south than they are at present. At the end of Jurassic time the sea withdrew for a while, but was to return after a period of land erosion about 120 million years ago, at the beginning of Cretaceous times, resulting in the deposition of a unique sandy deposit rich in calcareous sponge fossils bearing the name Faringdon Sponge Gravel. A deposit for which the town is World famous.

This booklet has been written as a guide to the local geology, describing and showing the distribution of the various rock types, some quite local and others imported from adjacent areas. The use of local stone has imparted a distinctive character to Faringdon and the other villages along the Golden Ridge, quite different from the towns and villages of the adjacent Cotswolds to the north and the Chalk Downs to the south.

The town itself is situated in the only valley of any significance cut into the northern side of the Golden Ridge which was eroded by a stream flowing northward into the Thames. In times past this valley has provided access onto, across and along the Golden Ridge, and Faringdon probably developed as a transit centre in this valley. The stream itself originates in the Faringdon Sponge Gravels, an excellent aquifer, which rest on the Corallian rocks above the town.

Faringdon is thus intimately related to its underlying geology. Many of its buildings have arisen from the very rocks on which they were founded, and the town probably arose as a transit centre within a northerly directed

valley eroded by a stream fed by water issuing from the Faringdon Sponge Gravel, probably augmented by melt waters during the last ice age.

Acknowledgements

I am very grateful to the many friends and colleagues who have discussed various aspects of this work with me, or have patiently read various drafts of this volume. I must particularly mention and thank Dr. Bill Horsfield, Ms. Jane Worral, my good friend the late Dr. Roland Goldring, formerly of the Geology Dept. of Reading University, Professor Andrew Goudie of the School of Geography, University of Oxford and my friend and neighbour Mrs. Mary MacGuigan and her family. Their comments have been invaluable and have been received with gratitude. I remain however entirely responsible for the views and conclusions expressed in this work. Finally I must thank my wife Carmen for her support and patience during the gestation of this work.

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About the author

Norman Snelling graduated in geology at the University of Manchester in 1951. After postgraduate work at Manchester he moved on to Australia and Canada. He returned to the UK in 1959 to join the Ministry of Overseas Development and was seconded to the Geological Age and Isotope Research Group at Oxford University. In 1969 he become part of the newly formed British Geological Survey and was appointed Head of Mineral Sciences and Isotope Geology. In 1986 he took early retirement and the following year became Visiting Professor at the Complutense University of Madrid. He became a permanent Professor at Complutense in 1988 and retired in 1995.

Throughout his career he has been much involved in overseas advisory work, particularly in Africa, South America and South East Asia. He also undertook periods of secondment to Geological Survey organisations in Morocco, India, and Chile, and was a member of the British Geological Survey Delegation to the People's Republic of China in 1979. In 1984, together with his wife Carmen, he undertook an extended secondment with the British Council in South America, working in Brazil, Argentina, Chile, Peru and Venezuela.

Since retirement he has been much involved with local geological organisations concerned with the preservation of geological sites of special scientific interest (SSSI) in Oxfordshire. He and his wife Carmen now live in Faringdon together with Dido, their black Spanish cat - a pure bred Callejero Madrileño.

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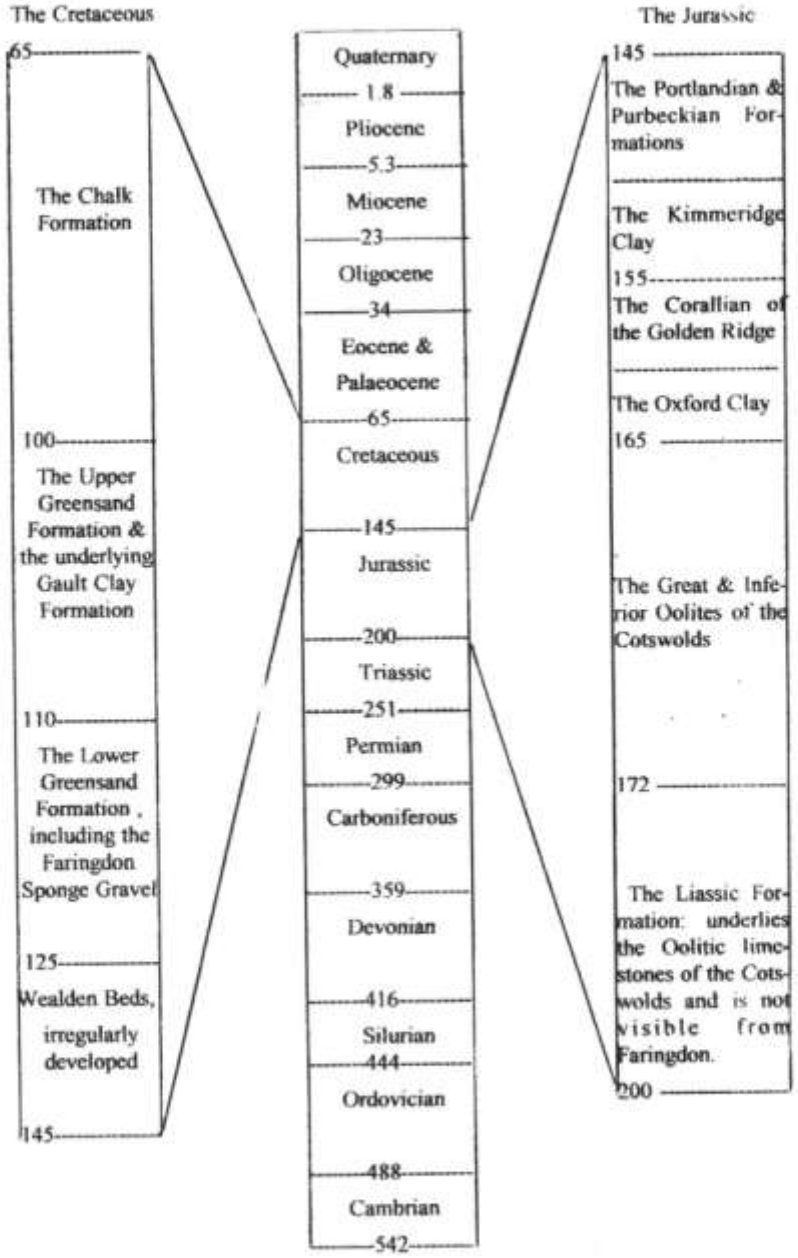
Fig.1:The Stratigraphic Column and the Geological Time Scale

Time Scale from 'A Geological Time Scale 2004,' by Gradstein F., Ogg J., & Smith A., Cambridge University Press, 2005.



Ages are given in millions of years. Vertical scale only approximate.

I
A review of the geology.

1) Introduction.

The ancient market town of Faringdon is situated on the western end of a ridge, about 100 metres in altitude, that extends westward from Oxford, to peter out in the vicinity of Highworth. The ridge, widely known as the Golden Ridge, is bordered on both the north and south by low lying clay vales, the relief between the vales and the ridge is no more than about 30 metres. On its northern side the ridge shows a steep scarp face and creates a marked feature when approached from this direction. On its southern side however the ground slopes away gently forming a dip or counter slope and the rise to the summit of the ridge is here barely perceptible (unless you are riding a bicycle!). The width of the ridge is no more than two or three kilometres. Beyond the clay vales that border the Golden Ridge, occur other ridges forming the Cotswolds to the north and the Downs to the south. These are much bigger features, both reaching heights in excess of 200 metres and widths of roughly 15 kilometres. All three features are characterised by steep northward facing scarps and gentle southern slopes, reflecting the disposition of the underlying rock strata. They are termed `cuestas' by geographers.

Owing to the physical, chemical and colour differences of the underlying rocks these three cuestas and the intervening vales have an individuality of their own. Their distinctive soils have given rise to differing types of agriculture and husbandry, and the rocks to equally distinctive building practices - the Cotswolds are characterised by buildings of well dressed limestone, the Golden Ridge by less well dressed, at times almost rubbly, but warm honey coloured grit, and the Downs by whitewashed clay and wattle and flint stones. It is the predominance of the warm honey coloured grits in the buildings of the Golden Ridge that has given this particular strip of country its name.

The whole region is one of exceptional natural beauty, due not only to the physical layout of the country with its many fine views of vales and ridges, woodlands and wolds, but also the successful agriculture and husbandry, reflecting many centuries of care and attention to the environment which have brought in considerable wealth to the region as a whole. It is one of the great tourist attractions of the United Kingdom and although the Golden Ridge is perhaps less well known than the Cotswolds and Downs, it is nevertheless an area of great but simple charm - an area of which Faringdon is the principle centre.

2) The Geology

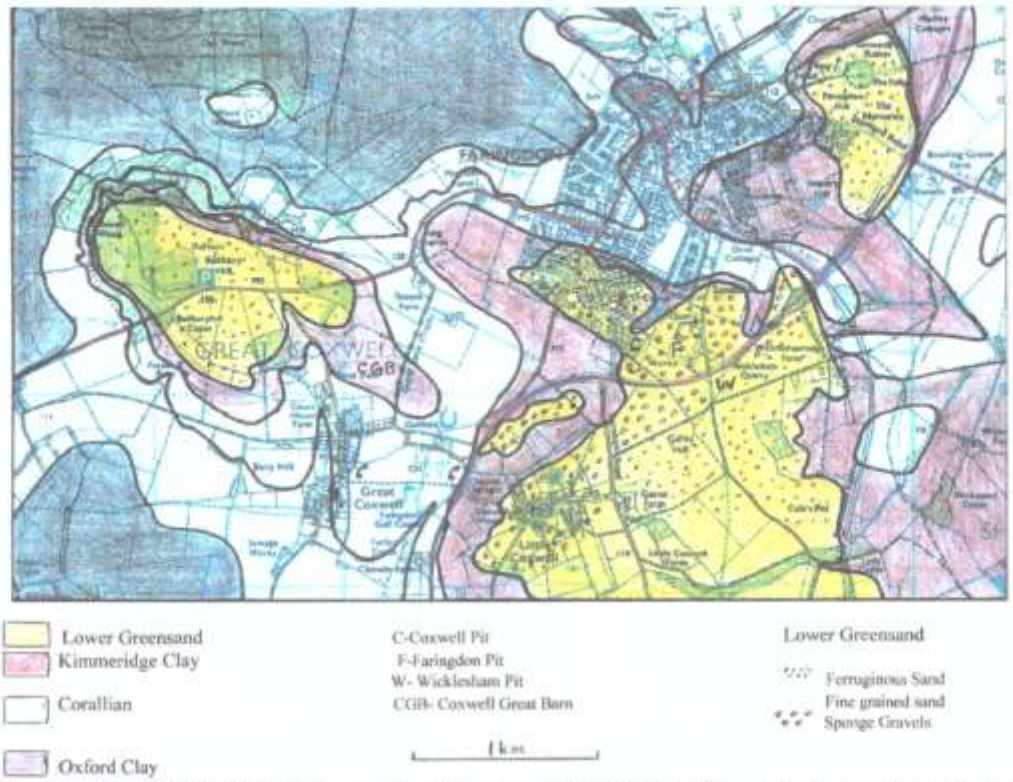


Fig.2. A geological map of the Faringdon area.Transposed and coloured geological map, edited by Dr.Graham Williams. Based on early work by R.V.Melville and A.J.Arkell (Arkell,A.J., 1947, The Geology of Oxford, OU Press), and the British Geological Survey 1:50000 Series Geological Map, sheet 253, 1971.

The views from the ridge on which Faringdon is situated encompass two of the great geological systems, namely the Jurassic and the Cretaceous Systems (see fig.1). It is convenient to think of a system as including a suite of rocks formed during a specific period of time - this is something of a simplification which ignores a long history of argument and discussion prompted by the fact that the boundaries between the various systems are in fact primarily defined by the fossil assemblages (remnants of life forms) that they contain. The determination of the absolute, as distinct from relative, ages of strata only became possible with the discovery of the phenomenon of radioactive decay just over a hundred years ago, but it is really only within the last fifty or so years that the development of the appropriate instrumentation has made it possible to express the ages of the various strata in millions of years to a reasonably fine degree of resolution. Thus we can now say that the Jurassic Period, that is the time during which the rocks of the Jurassic System were formed,

commenced about 205 million years ago and the Cretaceous Period ended about 65 million years ago. The oldest rocks that we can see to the north from the Golden Ridge, and which form the Cotswold escarpment, belong to the Middle Jurassic and are aged about 180 million years. The oldest Jurassic strata form the low lying vale on the north west of the Cotswold ridge and are out of sight. To the south the chalk limestone, that gives rise to the Downs, are the youngest rocks, and were deposited at the end of the Cretaceous Period.

The Stratigraphic Column, showing the position of the Jurassic and Cretaceous Periods in relation to the other geological periods is shown in fig. 1 . The Jurassic and Cretaceous Periods are also shown enlarged, with the rock formations (strata) appropriate to this area of southern England indicated, together with their estimated times of deposition, given in millions of years. It should be noted that these age estimates are still liable to slight modifications as new data are obtained, but such changes are not likely to exceed a few millions of years. The Stratigraphic Column and the Geological Time Scale are discussed in more detail in Appendix.1.

The Golden Ridge itself is underlain by Jurassic limestone of the Corallian Formation which was deposited in a warm shallow sea about 150 million years ago. In and around Faringdon the Corallian rocks are overlain by the Faringdon Sponge Gravel deposited during the Early Cretacous time about 110 million years ago (see section1.3 below). For comparison the oldest rocks in the UK, found in north west Scotland, are about 3000 million years old, and the earth itself was formed about 4550 million years ago.

The Ridge reflects the relatively hard nature of the rocks of the Corallian Formation, which dip gently to the south with a gradient of about 1 in 30 and which in the Faringdon area consists of a hard cap of limestone overlying a slightly softer gritty rock. Both are particularly resistant to erosion compared with the underying soft clay strata of the Oxford Clay, and the overlying Kimmeridge and Gault Clays. These provide easily eroded bedrock to the Thames and Ock rivers respectively. The Corallian Formation extends to the east as far as Wheatley, and to the west to a little beyond Highworth, giving rise to a picturesque 'cuesta.' Further to both the east and west the limestones and grits of the Corallian give way to clay formations which although deposited at the same time are of totally different character and indicate very different environments of deposition.

As already indicated, the view to the north is limited by the Cotswold Hills formed of hard resistant limestones which are overlain by the easily eroded Oxford Clay, which accommodates the bed of the Thames. Views to the south are limited by the Downs, formed also of a

relatively hard limestone - the Chalk Formation. The intervening Vale of the White Horse is underlain by two thick clay formations - the Kimmeridge and Gault Clays. The former is of Jurassic age and is the normal successor to the Corallian Formation, the latter is of Cretaceous age. The Kimmeridge Clay lies directly on the Corallian but its main outcrop is limited by erosion to the south of a line running from Abingdon to Longcot. However residual patches of the Kimmeridge Clay occur to the north of this line forming `outliers' and in the Faringdon area such an outliner forms the base of the Folly Hill, where it is overlain by the Faringdon Sponge Gravel. However at Badbury Clump the Sponge Gravel rest directly on a clayey variant of the Corallian and a little further to the north at Wood House the Sponge Gravel rests directly on the Oxford Clay. Clearly, some time after the deposition of the Kimmeridge Clay, uplift and some folding was followed by a period of erosion which `dug' deep into the Jurassic strata which were then exposed at the surface.

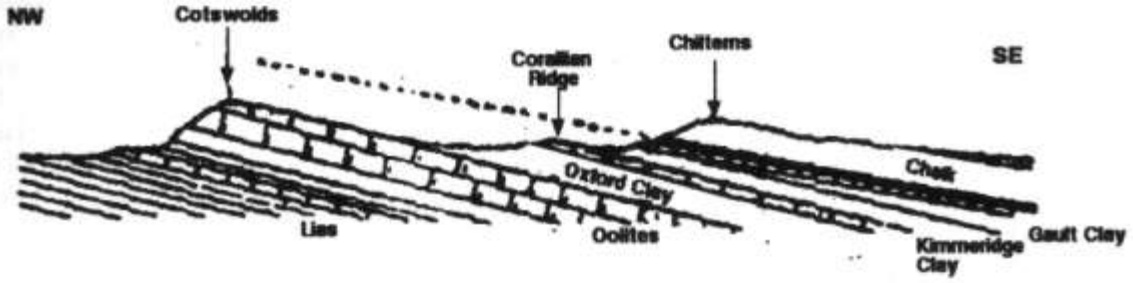


Fig.3. A geological cross section through the Cotswolds and Chilterns with the clay vales between broken by the lesser Corallian ridge on which Faringdon is situated.

This situation, whereby the earliest Cretaceous sediments in this region lie on Jurassic strata of different ages is known as an unconformity. It seems that for a period of some 30 or so million years at the beginning of Cretaceous times, the sea withdrew completely from a tongue of land extending south from the Midlands and some 35 kilometres wide, leaving dry land. Along what we now call the Golden Ridge there was considerable erosion, resulting in the removal of the two uppermost Jurassic formations - the Purbeckian and Portlandian, about 20 metres in thickness, and in some places the Kimmeridge Clay and the Corallian strata also. The Purbeckian and Portlandian are still preserved to the east and form a ridge extending from Thame to Aylesbury. To the west they form an outlier at Bourton about 8 km east of Swindon and, further west still, the ridge on which Old Swindon is situated. About 110 million years ago, in Early Cretaceous times, this

southerly protrusion of land was submerged again by the sea with the deposition of the Lower Greensand Formation, which includes the Faringdon Sponge Gravel, known internationally for the contained beautifully preserved fossils. It is of interest to note that if one stands by the A420 road to the east of Shrivenham and looks north east, the ridge of Furze Hill can be seen, the southern limit of which drops down to Fernham. The ridge stands about 40 metres above the level of a plain which slopes very gently down to the R.Ock. This ridge consists of the Lower Greensand Formation, here composed in the main of iron stained sands, resting on the grits and limestones of the Corallian Formation. The surface on which the sandstone of Furze Hill rests is a plane of marine erosion and a surface of unconformity, generated as the sea slowly spread across the irregular land surface. The present land surface on which the A420 road is built here corresponds very closely to an ancient sea bed. Eventually the sea covered much of what is now southern England and extended into Scotland as well.

The Lower Greensand Formation is followed by the Gault Clay, deposited as the sea continued to flood over the land surface. This results in the Gault Clay not only covering the Lower Greensand Formation but also spreading onto older rocks so in places the Lower Greensand Formation is absent from beneath the Gault Clay, and in much of the Vale of the White Horse the Kimmeridge Clay is followed directly by the very similar Gault Clay, the Gault Clay is said to `overstep' the Lower Greensand

The clays which floor the Vale of the White Horse are overlain to the south by a thin layer of sandy rocks assigned to the Upper Greensand Formation which, being well drained and fertile, has long been conducive to settlement - Didcot, Harwell, the Hendreds, Wantage, Childerly, Kingston Lisle, Compton Beauchamp, Ashbury and Bishopstone all being established on the outcrop of this particular Formation. Finally the view from Faringdon is limited by the high ground of the Downs formed of the Chalk Formation, a virtually pure limestone which rests on the Upper Greensand Formation. All of these rocks, like the strata of the Faringdon ridge, slope gently to the south. The Chalk itself was deposited in a warm relatively shallow sea, perhaps about 300 metres deep, which extended over large areas of north-western Europe and the British Isles as far as the Western Isles of Scotland and Antrim in Northern Ireland. Most of it is a limestone of unique purity. The near absence of detrital material, such as sand and mud, suggests that there was little input from rivers. Indeed the nature of the sparse sand grains that can be recovered from the chalk rock have characteristics indicating that they were derived from a desert land and were probably wind borne in origin.

In summary the strata encompassed by the views north and south of the Golden Ridge have a total thickness of about 700 metres, and comprise rocks deposited during the Jurassic and Cretaceous Periods between about 180 and 65 million years ago in a relatively shallow and warm sea which extended over much of north west Europe. This sea was rarely more than 300 metres deep and was sufficiently warm to support the growth of corals in the Corallian Formation. During this long period of time the extent and depth of this sea varied considerably and as indicated above, for a period of some 30 or so million years at the beginning of Cretaceous times, the sea withdrew completely from a tongue of land leaving dry land extending south from the Midlands (some 35 kilometres wide).

It may be of interest to readers that the term 'Greensand' (Upper and Lower) applies to the occurrence in Wiltshire from which the formation was first described, and there, as the name indicates, it is a sandy rock. 'Green' reflects the common presence (about 5%) of the green mineral glauconite which actually grows on the sea floor as sediment is deposited around it. It should be mentioned however that the Lower Greensand Formation in particular does not always consist of sandy rocks, neither does it always contain glauconite!

3) The Faringdon Sponge Gravel.

The Faringdon Sponge Gravel is part of a tongue shaped mass of the Lower Greensand which protrudes from beneath the Gault Clay between Uffington and Baulking and which extends to the north-west as far as the junction of Coxwell Rd. and Highworth Rd. south west of Faringdon's town centre. In addition there are isolated occurrences of this deposit - outliers - which give rise to Badbury Hill to the west of the town and The Folly Hill to the east. The well known Iron Age hill fort on Badbury Hill was the first settlement of significance in the area and gradually, as life became safer, folk moved down into what is now the town centre. They were presumably attracted by the sheltered valley of a stream which flows down from Jespers Hill through the present town centre and down past the Gloucester St. car park into the `lake' on the Faringdon House Estate. This valley is floored by sand, gravel and mud, washed down through the ages from the Folly Hill, giving rise to a well drained fertile and tillable valley floor ideal for cottage vegetable gardens. In addition to Faringdon, Little Coxwell Fernham and Uffington have all sprung up on this habitable Lower Greensand deposit and in times past the old railway link from Uffington Junction station similarly made good use of this stable and well drained rock foundation.

Over the past two hundred years or so Faringdon

has become famous for the beautifully preserved fossils found in the Sponge Gravel which are now to be found in academic collections, museums, and geological survey and oil company reference collections all over the world.

The Faringdon Sponge Gravel is a local variant of the Lower Greensand Formation. The rock consists of fossils or fossil fragments in a sandy matrix deposited in hollows in the sea floor, the result of erosion by marine currents. The fossils seem to have been wafted in by the submarine currents which swept clean the dead debris off the surrounding sea bed.

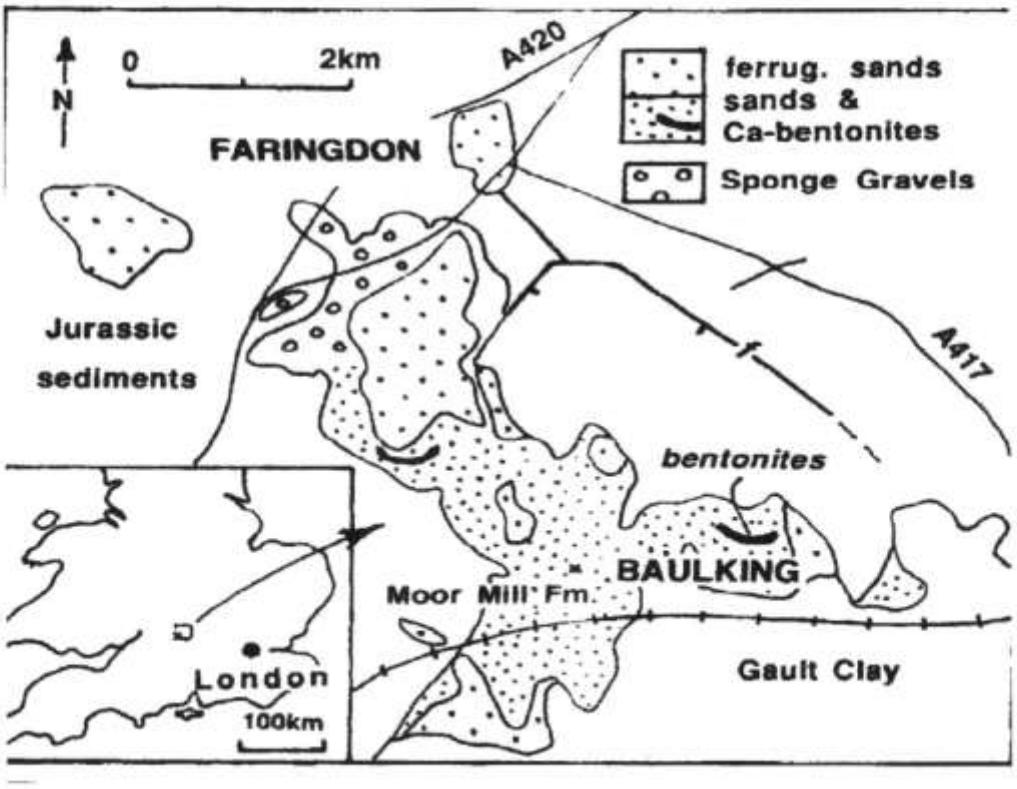


Fig. 4. A geological sketch map showing the distribution of the variants of the Lower Greensand Formation between Baulking and Faringdon. Bentonites are the Fullers Earth as extracted at Baulking. Ferrug.sands are iron stained sands which may have been 'mined' in prehistoric times as a source of iron ore.

The hollows are at least 10 metres deep and the deposit as a whole is about 50 metres thick. The Sponge Gravel itself is of limited extent, cropping out over the northern and western parts of the main outcrop of the Lower Greensand. It occurs below sands on Badbury Hill, but has not been found on the Folly outlier nor to the south of Fernham on the high ground of Furze Hill, where the rocks are iron stained sandstones which may have been dug out for iron ore in prehistoric times

Fossils have been collected from Faringdon since at least the seventeenth century. However it was not

until the latter part of the eighteenth century that it came to be accepted that fossils in general were the petrified remains of living creatures. Towards the end of that century William Smith, from Churchill in Oxfordshire - the father of British geology and one of the founding fathers of the science of geology - realised that the successions of rock strata that he had mapped as a practising drainage engineer and canal builder were characterised by unique assemblages of different fossils, specific to an individual stratum or groups of strata. An observation which now allows the correlation of strata on a world wide basis and is the life blood of the fossil fuel industries (oil and coal) and hence of our modern civilisation. It is also one of the foundation stones of Darwin's Theory of Evolution.

Fossils are common enough but are often so embedded in the rocks that their extraction and study is a matter of considerable difficulty. Faringdon's fossils occur in an often friable rock which sometimes can even be crumbled in the hand with the fossils literally falling out intact. The deposit is particularly well known for the occurrence of fossil sponges which resemble 'cigarette ends, egg cups and tea cups', the larger specimens sometimes looking as if they were badly fired and had started to sag! The sponge zooid itself is a simple creature, about 250 of which would form a queue about 25 mm long. They live in a colony and secrete a porous nest-like structure through which water can circulate bearing essential nutrients. One group constructs their nest of organic fibres and comprise the familiar bath sponge, another group has siliceous nests of which usually only fragments are found. The third group comprises the calcareous sponges in which the nest is calcareous (made of lime) and this is the type found at Faringdon. The porous interior has long since been filled with secondary minerals (calcite) so the fossils are generally solid and robust. Other common fossils are beautifully preserved bivalve shellfish, sea urchins (usually fragmented) and their spines, and also fossils derived from the underlying Jurassic strata, particularly the bullet-like belemnites, fish and crocodile teeth and occasionally a fragment of a dinosaur bone.

In and around Faringdon the Sponge Gravel has been extracted for many years from pits, three of which are still in existence, all are classed as Sites of Special Scientific Importance (SSSI). The Wicklesham pit, just by the junction of the A 420 and A 417 roads, is still being worked (2011), providing a high quality gravel for the construction industry. The tips in the pit are excellent collecting localities for fossils but since this is a working environment visitors and collectors can only enter in small controlled parties and with the permission of the owners. Faringdon pit, between the A 420 bypass and the town, is now a store yard for a

construction supplier. Good rock faces about 2 metres in height can be inspected but again this is a working area and intending visitors require the permission of the owners. Coxwell pit is situated on the Fernham Rd. south of Coxwell Lodge. This has now been developed in part as a housing estate. The actual SSSI part of the site is protected and forms a quarry face some 3 to 4 metres in height and about 100 metres in length together with a strip of land at the base of the quarry face, 3 metres in width. Is is hoped that this site will eventually be handed over to the Faringdon Town Council and become a recognised geological reserve.

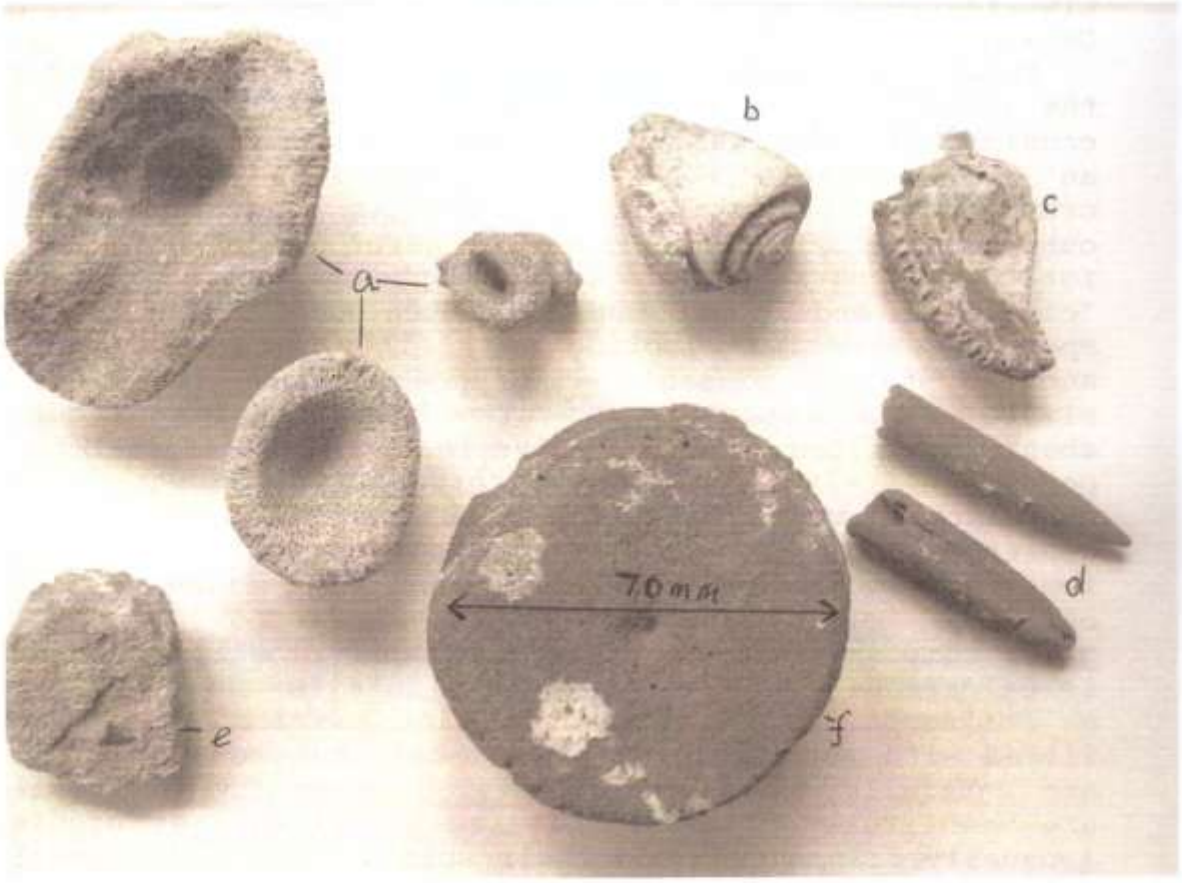


Fig.5. Fossils from the Sponge Gravels in Wicklesham pit. Note scale given for example 'f'. a) various calcareous sponges. b) a gastropod. c) part of a clam shell. d) belemnites - the internal shell of squids. e) the small black fragment is a fish tooth, probably from a small shark. f) Vertebral bone probably from a Pleisiosarus - most likely to have been washed in from skeletal remains originally deposited in older Jurassic rocks: this bone is about 25 mm in thickness.

4) Comments on the geological history during Jurassic and Cretaceous times.

Before continuing to investigate the impact of the geology on the development of Faringdon it is worth briefly discussing the question as to why such large areas of Britain were covered by the sea during these times. It has to be remembered that the continents as we know them have grown throughout geological time as the result of a complex interplay between various factors, most notably volcanic activity and the oceans. As they grew these early continental masses drifted around and at the beginning of Jurassic times the continents were all clumped together to form a huge super continent, albeit with large marine embayments, and with an area about 80% of the present continents. The present great mountain ranges such as the Alps, the Himalayas, the Rockies and the Andes did not exist. The climate was slightly warmer reflecting among other things a higher carbon dioxide content in the atmosphere, and the polar ice caps were on the wane. In Early Jurassic time this super continent began to split apart, sea water flooded in, submerging the ancient land surface over vast areas. The extent of this flooding reflected in part the greater amount of water .reflecting the lack of the polar ice caps, plus the fact that the slightly higher overall temperatures would have raised the temperature of the sea water causing it to increase in volume due to expansion. In addition the various processes associated with the splitting apart of the great continental land mass and the subsequent drifting about of the resultant fragments also brought about generally slight vertical movements. The seas formed during the flooding were rarely more than a few hundred metres deep which, considering that the continental slabs are about 20 - 30 kilometres thick, implies relatively slight sinking movement - only about 2%.

5) After the chalk:- flints , sarsens and Old Father Thames.

The deposition of the chalk at the end of the Cretaceous Period was followed by a period of uplift and the withdrawal of the sea towards the south over a vast area of north west Europe. The chalk rock and underlying strata were tilted, gently flexed and lifted vertically. These movements, possibly harbingers to the great episode of Alpine mountain building which was to follow some 50 million or so years later, were accompanied by profound changes in geography and climate, the latter from hot deserts to warm-temperate forest (not to mention the extinction of the dinosaurs the cause of which is still a matter of vigorous debate).

Once exposed to the atmosphere and covered with vegetation the chalk rock came under the attack of percolating rain water, which being slightly acid immediately started to dissolve the chalk away. It can be shown that considerable thicknesses of chalk rock were removed by this process - some 150 metres in Wiltshire and even more in Dorset - over 200 metres. Also attacked by this process were the remains of opaline (siliceous) sponges within the chalk and the minute marine radiolaria - single celled 'creatures' also characterised by siliceous skeletons. The percolating ground waters thus contained in solution a mixture of calcium bicarbonate and colloidal silica, in a delicate balance which could be readily upset, resulting in the precipitation of the silica to form flint. Typically this happened at almost imperceptible stratigraphic discontinuities within the chalk rock, giving the impression that the flint was deposited in layers directly on the ocean floor. It can however be convincingly demonstrated that the flint was formed after the deposition of the chalk rock, probably by several millions of years.

This episode of uplift and marine withdrawal was followed by a return of the sea over much of SE England, the northern limit of this marine transgression being approximately along a line from The Wash to Torquay. For the following 20 or so millions of years, during the Eocene Period, marine or swamp conditions continued, with plant remains indicating tropical or subtropical climatic conditions. The sea deepened to the south-east as indicated by the thickness of the major formation that hosts much of the London Underground system - viz the London Clay. This formation is some 180 metres thick at Southend on the Thames Estuary, 80 metres thick at Windsor and only a metre or so thick at Hungerford. This sea just extended into the Faringdon area, small traces of its strata being found at Buscot and sarsen stones at Coxwell. Sarsens are indurated masses of sandy rock deposited during this marine episode and cemented by silica extracted from percolating solutions (as with the formation of flint), which are left behind as residual boulders after the softer surrounding sand has been eroded away.

Although the events during the Eocene times are only modestly represented in and around Faringdon, spectacular things were going on in northern Britain where vast volcanic eruptions were taking place in what is now the western isles of Scotland and in Antrim. Fingal's Cave and the Giant's Causeway are witnesses of this volcanism which reflected a splitting apart of the crust and the opening of the North Atlantic. The great volcanic island of Iceland is the last expression of this event.

These events took place during the Eocene Period,

the oldest of a small group of periods which together comprise the Tertiary Era, ending about 2 million years ago. The Eocene Period is followed by two Periods, namely the Oligocene and the Miocene, encompassing the time span of from 37 to about 23 and 23 to about 5 million years ago respectively (see fig.1). During this extended period of time most of the British Isles remained above sea level. Only in the northern part of the Isle of Wight and the adjacent parts of the mainland are sediments of Oligocene age to be found. No sediments of Miocene age are known but the Miocene Period was a time of major rock deformation as the two great continental plates of Africa and India to the south and Eurasia to the north came together, giving rise eventually to the Alpine and Himalayan mountain ranges. Britain lay on the margin of the area affected by these great deformations, but existing folds and fractures in southern England were enhanced and a zone of quite intense folding running through the Isle of Wright and the Isle of Purbeck was sufficient to leave strata, including the chalk rock at the Needles, standing on end. Britain during this period of time was dry land, the folding and fracturing of the strata some several kilometres below the surface would have found expression in frequent earthquakes

It is possible that during, or towards the end of this period, the drainage system that was eventually to give rise to the present Thames came into being. The main drainage was to the south-east and possibly the present day rivers draining the Cotswold, such as the Churn, Coln, Leach, Windrush, Evenlode and Cherwell, are distant descendants of these early rivers - known as `consequent streams or rivers' in that they are a direct consequence of the slope of the land surface. This early drainage system extended far to the south-east but gradually these consequent streams eroded away the overburden and started to cut into the soft Oxford Clay that forms the bed of the present day R.Thames. Here side tributaries, or subsequent streams or rivers, were able to erode quickly and deeply into the underlying soft clay and rapidly cut their way along the soft clay in a SW-NE direction, more or less at right angles to the parent consequent streams. Eventually these side tributaries or subsequent streams joined up giving rise to the precursor of the present day Thames. This early Thames captured the flow of the original consequent streams flowing in from the north-west, thus depriving the continuation of these streams and rivers to the south east of water. The River Ock, which like the Thames lies in a clay vale (but of Kimmeridge and Gault Clay) probably had a similar origin, but remains a minor river lacking any significant flow of water from the north-west - viz the counter slope or dip slope of the Golden Ridge. When exactly this process of `river capture' occurred, is

a matter still the subject of debate. The interval of time from about 5 to 2 million years ago, known as the Pliocene Period, was one of some changes of sea level which would have had influence on the evolution of the drainage of any adjacent land mass. The river capture however appears to have been completed before the onset of the great Pleistocene Ice Age which started approximately 450 thousand years ago.

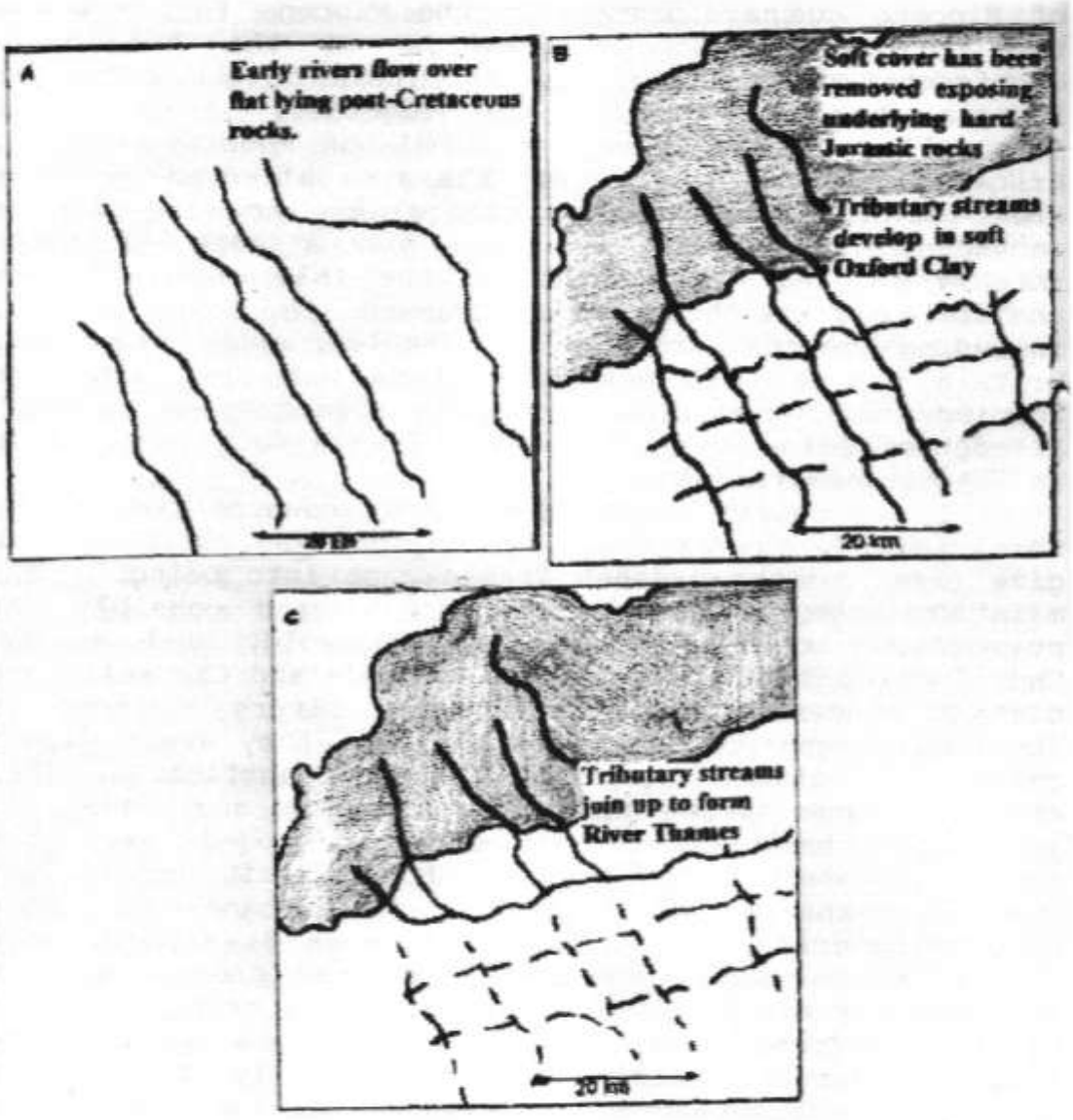


Fig.6.
A cartoon illustrating the development of the River Thames.

II

The influence of the geology on Faringdon:- building materials, sands and gravels.

The rocks that surround us have been an integral part of our heritage since humans first settled in this

region. They governed where we settled and the development of our agriculture and animal husbandry, and provided building materials for our towns and villages to give the Golden Ridge its particular character .

1) Grits and Limestones.

Perhaps the most distinctive feature of Faringdon, and indeed of the other villages that lie along the Golden Ridge towards Oxford, is the attractive honey coloured stone that is extensively used to build cottages, houses and walls. This rock is derived from the underlying Corallian Formation. The rocks of this formation were deposited in a shallow warm sea characterised by coral reefs. Two rock types in particular were developed in this environment - limestones and calcareous grits. The limestones formed mainly from the coral reefs which were partly fragmented by wave action and then cemented by lime precipitated from seawater. Coral fossils are abundant in these rocks, the casts of individual corals resembling a thimble are particularly common and sometimes massive blocks of colonial coral are to be found. Corals are environmentally sensitive organisms and changes in their environment can result in their death. In particular relatively minor falls in sea level of a metre or so can have fatal consequences. In these circumstances the dead coral reef can be fragmented by wave action, and gradually comminuted to small fragments. When churned up with shell fragments, and perhaps a little sand and mud, then cemented by precipitated lime, the rock so formed becomes a calcareous grit - the rock widely used in building construction along the Golden Ridge. The limestones and grits are often interbedded in units a metre or more in thickness reflecting periods of quiescence when the coral reefs were able to develop undisturbed and periods when, due to a slight fall in sea level, the coral reef was left high and dry to be smashed by wave action giving rise to calcareous grit. These variations may have reflected longer term cyclical variations in the Earth's climate.

The above type of environment was not regularly distributed. In the Faringdon district for example an upper layer of limestone rich in coral fragments and known as a coral rag (rag implying a poor quality building stone suitable only for building stone walls around fields etc.) overlies a thick layer of virtually unconsolidated sand which is commercially extracted in various quarries along the Faringdon to Wantage road as far as, and a little beyond, the Shellingford cross road. This sand appears to represent a massive sand bar that possibly developed at the mouth of a major river. Fragments of the coral rag, often containing coral fossils, are to be found in the recently ploughed fields

around Faringdon, a good locality being in the fields adjacent to the Great Barn at Great Coxwell.

Fig.7. Part of the front face of a typical Faringdon house built in the mid 18th century. The facing stones are well and evenly dressed and well coursed. The lintels are of wood and bricks are restricted to the quoins, the chimney stacks and the door and window frames. The original tiles were probably Stonesfield slate.

The limestone and grit have been used for building along the Golden Ridge for centuries. In the Faringdon district, All Saints church and the Great Barn are among the oldest buildings constructed of these rocks. In both cases, use was made of relatively poorly dressed mainly limestone blocks which because of their often irregular shapes were poorly coursed. Few other structures of this age have survived in Faringdon and most buildings date from the mid 17th century. By this time more use was being made of the calcareous grit which was better dressed (shaped) and by the mid 18th century, obvious care was taken in dressing the rocks to produce a characteristic block similar to a large wholemeal loaf. Such blocks characterise the fronts and visible sides of many Faringdon cottages and houses built between the mid 18th and early 19th centuries.

The source of these building stones which are so characteristic of the town is uncertain . All Saints Church and the Great Barn at Coxwell are built mainly of roughly dressed blocks of limestone, the rough dressing

reflecting the rubbly heterogeneous nature of this rock. It is akin to the Headington limestone (Corallian) extracted from the Oxford suburb of that name and extensively used throughout the city. In the Faringdon area the limestone was probably found locally and near the surface - indeed it could almost have been picked up in the local fields. The calcareous grit probably came from further afield and Dry Sandford is a possible source where good examples of the aforementioned rhythmic variation of coral reef and calcareous grit can also be seen. However there are records and remains of quarries all along the Golden Ridge, any of which could have produced suitable stone for local building. It is unfortunate that quarries are ephemeral and are soon filled in once exhausted. For example, large quarries in Stanford in the Vale which were actively being exploited in the early part of the last century have now completely disappeared, and their sites are occupied by housing and industrial/office estates.

Compared with the limestones which characterise the Cotswolds the grits and limestones used in Faringdon and elsewhere along the Golden Ridge are of relatively poor quality. The grits in particular are friable and weather easily. If footed by a concrete path, for example, the fine dust that is weathered away is clearly visible on the path after a month or so of weathering. The grits and limestones are also difficult to size and shape which accounts for the large-loaf size of the grit blocks in particular. They are not suitable for framing windows or as supporting lintels. In most of the pre-19th century houses lintels are typically massive oak beams and window jambs and sills are often of brick.

By about 1750 or perhaps a little earlier, the quarries were producing fairly well dressed blocks of calcareous grit, about the size of a large wholemeal loaf. These were used extensively in the building of houses and cottages throughout Faringdon. They were used however mainly in the construction of the front and side walls of houses and cottages where they were easily seen by the neighbours. Less obvious side walls and the walls at the back of properties, are typically built of poorly dressed grit and limestone, as are garden and property walls throughout the town. All are worth inspection, the grey/white limestone blocks often contain fossil corals and the grits can be seen to contain abundant shell fragments.

The older buildings are built of poorly dressed grit and limestone - a good example being the side wall of the Bell Hotel, opposite the entrance to Barclays Bank. In some cottages the building material is little better that quarry rubble, limestone and grit but with occasional blocks of lime-cemented Faringdon sponge Gravel.

Fig.8 . Where not visible to the neighbours, house walls were built of virtually undressed rag stone and are often rich in fossil shells or pieces of fossil coral and are as much limestone as grit. The stones used in the construction of this side wall are roughly ellisoid in shape which allows only a crude coursing. The white marker is about 15 cm long).

2) Freestone.

Freestone is a fine grained and homogenous rock, usually a sandstone or a limestone, that can be cut by a saw and further shaped and dressed by the use of a mason's chisel or bolster and a mallet or maul, the surface finally being smoothed with a tool known as a drag. Faringdon has many examples of windows framed

Fig.9 . A particularly fine example of freestone used in construction at Bourton

in freestone dating from the construction of All Saints Church to the Primary School on Lechlade Rd. and the Town

Hall. It is also used as quoins and facing stones on the homes of the more prosperous (in their times at least) and as a facing stone on the Post Office built in 1898. The buttresses supporting the walls of the Great Barn at Coxwell are of freestone as are the pillars supporting the old Town Hall

All the local freestone is a fine grained oolitic limestone. If examined with a hand lens it can be seen to be composed of an aggregate of tiny spherical bodies or oolites, typically less than half a millimetre in size. The oolites are of lime and, under appropriate conditions, are precipitated out of sea water to accumulate on the sea bed like a fine sand. Underwater currents move the ooliths , just as wind blows sand around on the land surface to form dunes. The winnowing effect of the submarine currents could result in the concentration of foreign material, such as tiny fragmented shells, on the surfaces of the oolite `dunes' and these show up as dark streaks on cut faces of the freestone when quarried and cut. The effect is know as current bedding. In situ this bedding typically dips at low degrees but when quarried, cut and incorporated into a structure the dark streaks may display a random orientation. Differential weathering of a current bedded limestone produces a ribbed effect which is well displayed in the oolitic limestone blocks used in the construction of the buttresses of the Great Barn at Coxwell, and the columns which support the Old Town Hall in Faringdon.

Freestone is widely distributed in the Cotswolds and has been extensively quarried, particularly at Taynton near Burford, for use in nearby Oxford where the sources are recorded in various old records and accounts. The freestone seen in Faringdon probably came from the same source. It was the custom to transport building stone from Taynton by horse and cart to Radcot Bridge and then by barge to Oxford and further afield.

3) The coming of bricks.

In Faringdon chimney stacks are normally built of brick, though some of the older pre-17th buildings have stacks constructed of dressed limestone blocks almost certainly imported from the Cotswolds to the north of the Thames. The difficulty of dressing the grits of the Golden Ridge to give neat blocks suitable for chimney stacks, and possibly too because of their relatively poor heat resistant qualities, meant that Faringdon builders clearly opted for bricks as soon as they became available at a relatively cheap price and in reliable supply. This situation had to await the development of canals, for although the raw material for brick and tile making is abundant in the clay vales to the north and south of the town, a supply of cheap fuel for the brick furnaces

manufacture. The clay is favoured by a relatively high carbon content which ignites once the appropriate furnace temperature is reached so reducing significantly the amount of fuel needed to fire the furnaces.

4) Slates and tiles. Slate is an old word simply meaning a type of stone that splits readily into thin laminae However for some two hundred years geologists have adopted the word and given it a genetic significance. They now take the word to mean a rock which was originally a shale or mudstone which has been subjected to compression and moderate heating at great depth, so that its original clay minerals and sand grains recrystalised into flaky micaceous minerals with a common orientation, lying in roughly the same plane approximately at right angles to the axes of compression. Such rocks split very easily into thin laminae only a few millimetres thick. In the British Isles such slate occurs in south west England, North Wales, the Lake District and Scotland. Although long used in these areas it was not until the coming of canals and the railways that they began to appear in southern England.

Fig.10 . The Great Barn at Coxwell The massive roof is tiled completely with Stonesfield slates.

Before the availability of such 'slates' however the aforementioned slates, rocks which simply split easily,

were used whenever locally available. In the Cotswolds such slates were used in the many Roman villas so characteristic of this region. These slates are sedimentary rocks, composed of tiny mineral fragments of sand, clay and some lime which settled at the sea bottom into thin layers which were gently compressed by the weight of sediments deposited on top, and which when dug out, could be split fairly easily into thin slabs perhaps about 5 - 10 mm thick. Such sediment is well developed in the vicinity of Stonesfield near Witney. It was found that the splitting process could be made more effective by frost action. Large blocks of the local rocks were left to stand outside throughout the winter and, if subjected to a few good frosts, were found to split in a reliable and easy way. The slates quickly became know as Stonesfield slates and were rapidly put to use throughout the Cotswolds and along the Golden Ridge. They were obviously easier to put in place, not subject to the risk of fire, and did not need replacement every twenty years or so as did the traditional thatch. A magnificent example of a building roofed by these Stonesfield slates is the Great Barn at Coxwell just on the west of Faringdon (see fig 10).

The Great Barn was built in the early part of the 14th century and clearly the production of Stonesfield slate was already a major local industry at that time. In the early 1960s all the roof slates were replaced, also by Stonesfield slate.

Even though these slates were relatively easy to transport in bulk, there may have been an economic limitation to the distance that they could be transported by cart and canal, and in a south west direction Stonesfield slates did not penetrate much farther than Faringdon on the Golden Ridge. In Shrivenham, cottages built in similar style to those of Faringdon have preserved their thatched roofs and other similar cottages in Tubney and Frilford also still have thatched roofs. The notable absence of thatched properties in Faringdon may reflect the considerable damage inflicted on the town during the Civil War(1642-48) - perhaps it was just more convenient to tile the rebuilt living accommodation rather than thatch it.

To the immediate south of Faringdon, in Fernham, timber framed cottages also have thatched roofs. In Wantage and other places across the Downs however locally fired bricks and tiles quickly became the favoured building materials, although wattle infilled timber framed cottages and farmhouses with thatched roofs still remain, though no longer the homes of poor farm labourers and struggling farmers!

As already mentioned one particular advantage of the spread of bricks and tiles - both of the Stonesfield type and 'fired' tiles from the brickfields - was the dramatic reduction in the outbreak of fires in the towns and

villages from about mid 16th century onwards. The earlier extensive use of thatch for roofs, and wood in building construction, presented obvious fire risks.

5) Flints.

Flint is not a very common building stone along the Golden Ridge but gradually makes its appearance to the south, and is widely used in the chalk country throughout south Oxfordshire, Wiltshire and Dorset. It typically occurs as seams in the chalk rock and gives the impression of having been deposited with the chalk (but see section I.5 above). It is composed of silica, the same material as the classical golden beach sand, but although a grain of beach sand may be composed of only a few individual crystals of quartz (silica) a similar grain of flint would be composed of a huge number of individual crystals. In technical terms the grain of beach sand is said to be crystalline while the flint is cryptocrystalline.

6) The extraction industry.

The source or sources of the stone used extensively for house and wall construction along the Golden Ridge, particularly during the hey-day of building in the 17th and 18th centuries is not obvious, although the most likely source area appears to be in the now disused quarries around Cothill and perhaps further east as far as Headington in Oxford. At the beginning of the 20th century stone was also being extracted from quarries in Stanford in the Vale. Wherever these sources, they were still supplying stone until the end of the 19th and the beginning of the 20th century, as is evidenced by the use of such material in the construction of the Faringdon Board School (now the Primary School) on Canada Lane in 1892 and the Town Hall Offices on Gloucester St. in 1862.

Faringdon itself has long been a centre of the extraction industry, the Sponge Gravel providing gravel for construction, as have the sand pits in and around Stanford in the Vale (exploiting the underlying Corallian rocks), for well over a hundred years. Fuller's Earth, in the vicinity of Uffington and Lambourne, was exploited for the treatment of sheep's wool for many years. In the 1960's exploration initiated by the British Geological Survey revealed a sizeable deposit at Baulking which has since been developed for various industrial uses, at one time some 5000 tons were exported per year to Sweden alone. Fuller's Earth is a clay mineral derived from volcanic dust deposited in the Lower Greensand sea - the same sea that had seen the deposition of the Sponge Gravel.

At a guess the local extraction industry is currently responsible for the direct employment of about a hundred or so people, and has probably employed at this sort of level for at least the last hundred years. As for our famous fossils, these are not just curiosities to be deposited in museum display cases. They are essential for the training of geologists, while for the professional geologist, concerned with strata correlation on the basis of the fossils found therein, which is the lifeblood of the fossil fuel industry, good specimens are essential for correct identification of the fragmentary pieces recovered by exploration parties in the field or from exploratory borehole cores. The quarries themselves, all too often used as landfill sites, are also essential both for training geologists and for the enlightenment of the experienced professional. Expecting geologists to learn and practice their science without access to the large exposed faces of rocks found in quarry faces is like expecting a surgeon to learn his skills without access to the cadavers in the Dissecting Rooms of the Medical Schools.

III

Comparison with other local towns and villages.

Faringdon is situated near the western end of the Golden Ridge and the visitor does not have to go far to encounter towns and villages of quite different aspect. Perhaps the most striking difference is that between Faringdon and the nearby town of Lechlade. Whereas Faringdon is typical of the other towns and villages on the Golden Ridge, Lechlade, a long established major crossing of the R.Thames and built on Oxford Clay, is completely Cotswoldian in aspect. Most buildings are constructed of a well dressed smooth surfaced light tan coloured limestone which consists dominantly of lime precipitated from seawater, mixed with lesser amounts of clay and fine sand to form a virtual cement. In contrast the building rock of the Golden Ridge is characteristically the rough surfaced Corallian grit, which consists essentially of finely comminuted fossil shells and coral fragments with a little fine grained sand and clay, all cemented by precipitated lime.

The limestone building blocks, so common in Lechlade, are widely used in building throughout the Cotswolds and the source stone has been quarried extensively, but particularly in the vicinity of Taynton near Burford. The route from Burford to Lechlade slopes gently downhill and the movement of good quality building stones would have been relatively easy. This limestone was clearly preferable to the Corallian limestone and grit from which Faringdon is built. It is easier to

dress and to produce neat brick shaped blocks with polished faces, and easier to pack and transport. The Corallian rocks however are not easy to dress, the grits in particular cannot be reduced to the same neatly sized `bricks' with smooth surfaces, and are much less resistant to the effects of weather. The advantages of the Cotswold limestone is well seen in its use in the construction of chimney stacks, The neat size and superior weathering and heat resistant properties of the limestone made it a far superior construction material for this particular job. In Faringdon the use of local Corallian material for chimney stack construction (among other things difficult to size and shape for this particular job) obviously ceased as soon as the superior fired bricks became available in bulk supply.

Freestone is rather more common in Lechlade than Faringdon but this may only reflect the easier transport route, and hence lower cost, from the source region in the Cotswolds. As in Faringdon the frost split Stonesfield tiles dominate the roofs of the town. However it is the contrast between the smooth, tan coloured Cotswold limestone and the honey coloured rough surfaced grits which gives Lechlade and Faringdon their individual characters. The difference is such that you might almost be in different worlds.

There is an interesting contrast between Faringdon and Shrivenham Situated more or less at the end of the Golden Ridge the older cottages and houses of Shrivenham are constructed in a similar style to those of Faringdon with characteristic wooden lintels. However most of these buildings are still thatched and for some reason, perhaps the additional cost of transport, the Stonesfield tiles, so typical of Faringdon, did not catch on in Shrivenham. Closer inspection also reveals that a grey limestone has replaced the calcareous grit so characteristic of Faringdon and other villages and cottages further east along the Golden Ridge. The most likely source of this limestone is the Late Jurassic limestones of the Portlandian and Purbeckian Formations (see fig.1)which occur nearby at Bourton and a little further to the west in Old Swindon. Bourton itself is situated on a low hill which is an outlier (an isolated remnant) of the Portlandian limestone that forms the ridge on which `Old Swindon' is built. This is an excellent building stone and is used extensively in the buildings of the village. It is similar to the Cotswold limestone used in Lechlade but was probably quarried locally, or may have been derived from the quarries in Swindon which were recorded as early as the 17th century as already producing good building stone. The use of this stone may also have encroached further east as far as Longcot where the church is built of limestone - it being an easy route from Bourton and Old Swindon to Longcot. Lechlade is largely built of similar well

dressed and well coursed limestone derived from the Cotswolds to the north.

Fig.11. The Old School House at Bourton - a good example of Portlandian limestone of local origin. Note the well formed - dressed- and well coursed limestone 'bricks'.

To the south of the Golden Ridge, outcrop of the Corallian Formation is locally exposed as far as Stanford in the Vale. Corallian grits and limestones were extensively quarried here until the early 20th century and the village itself is comparable to the other towns and villages of the ridge. Elsewhere, in the Vale of the White Horse, fired bricks clearly came to dominate construction work, reflecting the abundance of suitable clays for brick making and the canal and railway transport revolution which bought in fuel for the brick furnaces and allowed the easy outward transport of the bricks so produced. Relatively little is to be found of the buildings of the 18th century and earlier, but it is most probable that the construction style was of timber framed buildings with clay and wattle infill, the infill in places being later replaced by brick, and with thatched roofs. This style is still extensively found over the chalk downs further to the south, following the chalk outcrop south to Winchester, Salisbury and Dorchester in Dorset. The chalk itself is not a particularly suitable building stone but over this whole

area considerable use is made of flint which occurs as seams in the chalk rock.

IV

Why Faringdon is where it is!

One notable result of the evolution of the Thames is the absence of tributaries on its southern side as it flows along the Oxford Clay vale. There is however one important though barely noticeable exception and this is the small stream which flows, now in a culvert, under the centre of Faringdon market area. This rises on Jespers Hill at the back of the town and flows under the town centre and along a valley between the present day Lechlade Rd. and the parish church of All Saints, and now drains into and maintains the `lake' on the Faringdon House Estate. A lake may originally have been established in mediaeval times as a source of fresh fish for the House, the present lake however appears to be a more modern feature, constructed when Faringdon House was rebuilt following the Civil War.

The contours clearly indicate that the stream which now flows into the lake originally continued through the site of the present day Sewage Works and ended up in times past in the Thames. It is now quite insignificant and was recently completely overlooked during relaying of gas mains, to the great inconvenience of the town. Despite this it has in the past `had its day'. The valley it has eroded is of considerable magnitude with a length of about one and a half kilometres, a width of about a kilometre and a depth of about 30 metres. The cutting back of this valley was certainly not the result of the minor stream that presently occupies it, but most likely reflects the presence of an ancestor stream whose flow was considerably augmented by melt waters during the Late Glacial times. The tentative estimates of river discharge in the Cotswolds during Late Glacial times suggest peak flows at least 13 times greater than at present. In addition to this Late Glacial discharge a constant source of flow and probably the origin of this stream/river has been the Faringdon Sponge Gravel, the northern limit of which ends on Jespers Hill. This deposit forms a tongue extending from under the chalk ridge of the Downs as far north as Faringdon. It is a significant deposit and an excellent water reservoir or aquifer, in places over 40 metres thick. Water would readily soak into this sandy rock and would be retained therein by the underlying impervious Kimmeridge Clay on which it generally lies, the water gradually seeping out at the level of the junction of the two strata. In addition to these two factors: viz a suitable aquifer supplying water, supplemented by winter snow melt water,

the erosive cutting back of this stream or river would be enhanced by the behaviour of the Thames into which the stream flowed. Because of the vigorous flow of water into the Thames, virtually entirely from tributaries entering from its northern side, the Thames tends to migrate to the south. Apart from the erosive effect of this migration on the northern scarp face of the Golden Ridge, the Thames is also undercutting the mouth of the Faringdon stream at their junction. Thus the erosive power of the Faringdon stream is constantly being enhanced as it attempts to adjust to a constantly changing new profile.

Compared with the 1 in 20 (approximate) climb up the northern scarp of the Golden Ridge, this valley would have provided easy access onto the Ridge and hence in early times to the south-west and north-east along the Ridgeway and Upper Icknield Way. Faringdon was thus to develop as a transit junction linking two of the important crossings of the upper Thames at Lechlade and Radcot. Both are of considerable antiquity, *gelad* as incorporated into the name Lechlade, is of Saxon origin meaning a passage or crossing, and the bridges at Radcot date from mediaeval times, about 1200. In Anglo Saxon times the route along the well drained top of the Ridge to Oxford, where the Thames was forded by a paved hard surfaces as early as the eighth century, was already well established. An important route has also been postulated coming south from Burford, crossing the Thames at Radcot and continuing on to Stanford and Wantage - a route which almost certainly would have made use of the Faringdon valley up and over the Golden Ridge. This route could also have communicated with one of the most important roads in Anglo-Saxon England which bisected the Midlands and joined Northampton to Southampton via Oxford, Newbury and Winchester. The connection to Lechlade would also have provided important access to various major centres in south west England.

We can assume that the town of Faringdon developed gradually in response to the location's importance as a transit route from very early times. Indeed the location of the Iron Age Badbury Camp could well reflect it's strategic position, providing as it does an overview of the routes from Lechlade and Radcot.

The present day entries of the roads from Radcot and Lechlade are clearly anomalous in that they both directly scale the face of the Golden Ridge, to the east and west of the parish church respectively, where it is at its steepest. It seems more likely that in times past these roads joined in the vicinity of the present day Sewage Works at the base of the ridge, and then followed the valley on its eastern side into the town centre. Perhaps the private road that enters the Faringdon Estate along the west wall of the churchyard, with a branch to the House, and then a swing to the west, to an exit on

the present Lechlade Rd., is a relic of the earlier road system. The pirating of the original road entry which followed the stream valley may have occurred when the `lake' was 'enhanced' following the Civil War. Before, and for some time after the Civil War, enclosures of parks and farmlands could be enforced by powerful landlords against the wishes of poor parishioners or tenants and of parliament with relative ease. The closure of the `valley route' into the town and the diversion of the Radcot and Lechlade roads up the steep incline of the Golden Ridge could well have been at the whim of the local `Lord of the Manor'.

Thus Faringdon has developed in a valley which provides important access onto the Golden Ridge and thence to the south-west, south ,and east. The valley itself is the result of water flow out of an important aquifer, which emerges from beneath the chalk Downs and extends northward as a tongue of strata to Faringdon and locally beyond. The outflow of water was augmented considerably during Late Glacial times (10 to 50 thousand years ago approximately) by the discharge of glacial melt waters . The reservoir stratum is the Lower Greensand Formation characterised at its northern extremity by a local variant, the Faringdon Sponge Gravel. The town is thus intimately connected to the local geology by the materials used in its construction, by sands and gravels the extraction of which provide local employment, and which gave good well drained soil encouraging settlement and which was extensively exploited in the past for horticulture. The town also owes its very origins to a valley excavated by waters flowing out from the rocks it is built of and built on, which made it an important transit centre generating related service `industries' reflected in the granting of its Market Charter in the early thirteenth century. It remains a quintessential small English market town, in harmony with its gradually evolving environment, a place of peace and interest to its visitors, and in every respect worthy of the support, and indeed affection, of those of us fortunate enough to be its residents.

Appendix:1

Geological Time and the Stratigraphic Column

Fig.1 shows the divisions of geological time over the last 560 or so millions of years in the Earth's history. The Earth itself formed about 4550 million years ago and the oldest rocks that we know of are about 3500 million years old. However it was not until some 650 millions of years ago that environmental changes, notably the build up of free oxygen in the atmosphere, resulted in an evolutionary surge which gave rise to easily recognisable multi-cellular life forms. Prior to this time the life forms, which go back to at least 3500 million years, were mainly single celled organisms, recognisable only with difficulty, although some did live a colonial existence and formed recognisable fossil remains.

The early multicellular organisms began to appear about 650 million years ago, they are mainly creatures like the present day jelly fish and simple worms, and are only preserved in a few very favourable deposits. However at the beginning of Cambrian time, about 560 million years ago, two dramatic evolutionary steps took place at about the same time. The multicellular creatures developed the ability to form supporting and protective exoskeletons. One line of evolution resulted in the formation of shells of lime - calcium carbonate - extracted from the water in which they lived. Shell fish, sea urchins, starfish, corals, and some sponges are among the creatures which use lime in this way. The second line of evolution saw the development of exoskeletons of chitin - a fibrous protein related substance. Crabs, lobsters and many insects are among the creatures which have followed this line of evolutionary development.

On the death of the host creature these calcareous and chitinous exoskeletons are relatively easily preserved in water-lain sediments, giving rise to fossils. William Smith (1769-1839), born in Churchill in Oxfordshire, was a practical canal and drainage engineer and among the first to recognise and systematically map the layered nature of many rock deposits. In addition however he realised that the fossils in the rocks he was mapping varied in a systematic way, and was able to distinguish one rock stratum from another even if they were of similar lithology i.e similar rock type, and conversely was able to show that completely different rock type, if they contained the same fossils, were of the same age and were might well be in physical continuity. An excellent

example occurs at the Oxford end of the Golden Ridge which simply peters out at Wytham. However if you follow the line of the Golden Ridge across the Thames towards Kidlington you find you are on a heavy clay known as the Ampthill Clay. Despite the complete difference in rock type the Ampthill Clay was deposited at the same time as the grits and limestones of the Corallian formation of the Golden Ridge and although many of the fossils in the two rock types are different this only reflects the different environment viz sea creatures which lived on a muddy sea floor as opposed to those that lived on a clear, sandy sea floor. Free swimming species such as the ammonites are the same and indicate deposition of these two different rocks at the same time. Geologists can now correlate rock formations on a world wide basis on the basis of their fossil content and this is the basis of many aspects of geological work, in particular the search for oil, gas. coal and water.

The names of the geological periods arose in an almost haphazard way during the 18th and 19th centuries. However it is putting the cart before the horse to talk of the geological periods. At first geologists were dealing with sequences of strata which they recognised as having certain features in common over large areas and which were assigned to `systems' rather than `periods'. The names applied to these systems or groups of strata may have reflected their location, their rock types, or some other feature. Thus the term Devonian System reflected pioneering geological studies in Devon. The rocks of the Permian System were first described from the Perm Province of Russia, but the Cretaceous System reflected the dominance of the chalk rock, at least in NW Europe. As this conglomeration of system names came into being and was put into a time order, so the name `period' came into use as indicating the period of time ( initially unknown) during which the strata of a `system' were formed. It was not until the 20th century that it became possible to assign ages (in millions of years) to the strata of the geological systems and hence to define the ages of the geological periods. This was one of the first practical results of the discovery of radioactivity - the phenomenon by which an unstable `parent' atom of a certain element undergoes change or decay to form a stable, chemically different `daughter' atom. The best known example of such decay is that of uranium to lead but other decay schemes are known and all have been utilised to determine the ages of rocks. With the development of science and technology through the 20th century the dating of rocks has changed from that of time consuming difficulty to a virtual routine. One recent compilation of data contained over 250 examples of dated rock, in many cases each sample or group of samples having been dated by several methods.