

Residents and visitors to Faringdon are more than likely to be aware that the town is situated on a ridge which rises steeply to a height of about 30 metres above the Thames valley to the north and which slopes more gently into the Vale of the White Horse to the south. This reflects the underlying layer of hard rock which dips gently to the south with a gradient of about 1 in 30 and which consists of a hard cap of limestone overlying a slightly softer gritty rock which are both relatively resistant to erosion compared with the soft clay strata which lie underneath (the Oxford Clay) and above (the Kimmeridge and Gault Clays) and which provide easily eroded bedrock to the Thames and Ock rivers. The view to the north is limited by the Cotswold Hills formed of hard resistant limestones and to the south by the Downs also hard limestones. All of these rocks, like the strata of the Faringdon ridge, slope gently to the south.

The strata encompassed by these views have a total thickness of about 700 metres, and comprise rocks deposited during the Jurassic and Cretaceous Periods between about 200 and 65 million years ago. Most of them are sediments deposited in a relatively shallow and warm sea which extended over much of north west Europe which was then situated at a latitude appropriate to present day Gibraltar. This sea was rarely more than 300 metres deep and was sufficiently warm to support the growth of coral reefs. Check the rock rubble in any of the recently ploughed fields around Faringdon and you may well find fragments of coral. Some of the houses in the town also have pieces of fossil coral built into their walls.

During this long period of time the extent and depth of this sea varied considerably and for a period of some 30 or so million years at the beginning of Cretaceous times the sea withdrew completely leaving dry land. The youngest rocks deposited in Late Jurassic times were then subject to erosion and in places partly or completely eroded away. In places however residual 'lumps' of these rocks have been left behind forming what the geologist calls 'outliers'. A good local example is the hill on which Swindon Old Town is built.

About 110 million years ago, in Early Cretaceous times, the sea level rose and started to flood, first southern England and eventually most of England and well into Scotland. Over southern England the first sediments to be deposited by this great marine transgression are known as the Lower Greensand formation. These are the rocks which in Faringdon have yielded beautifully preserved fossils to be found in academic collections, museums, and geological survey and oil company reference collections all over the world. The term 'Greensand' 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' refers to the presence (about 5%) of the green mineral glauconite which actually grows on the seafloor as the sand is deposited around it. It should be mentioned however that the Lower Greensand formation is not always a sandy rock neither does it always contain glauconite. With time the sea spread even further over the land and the sediments being carried in by rivers became very muddy resulting in the deposition of the Gault Clay over much of southern England. It rests on the Lower Greensand and also 'oversteps' onto older rocks, with the result that the present level of erosion does not everywhere expose the Lower Greensand beneath the Gault. It is by a twist of fortune that the Lower Greensand is so well exposed at Faringdon.

The Gault Clay is overlain by the Upper Greensand Formation and this in turn is surmounted by the Chalk forming the prominent ridge of the Downs to the south of Faringdon. The sea by this time had spread far to the north and west and marine sediments of the same age are to be found in North-East Ireland and western Scotland.

The Upper Greensand tends to be more consistently 'sandy' than the Lower Greensand and the green mineral glauconite is also more commonly present. Both 'Greensands' are conducive to human habitation, they drain well, are fertile and easily tilled. The Upper Greensand forms a notable rise at the base of the Chalk escarpment, travelers from Faringdon to Wantage will probably have noticed this distinct rise as they pass through East Challow. Whereas for reasons mentioned above the Lower Greensand often only manages to peep from beneath the overlying Gault Clay, the Upper Greensand is well exposed between the Gault and the Chalk and the line of towns including Didcot, Harwell, East and West Hendred, Wantage, East Challow, Childrey, Kingston Lisle, Compton Beauchamp, Ashbury and Bishopstone are all sited along its outcrop reflecting its conduciveness to human settlement.

The occurrence of the green mineral glauconite in the Lower and Upper Greensands is worth additional comments. It is one of the few minerals to actually develop in the marine environment as sediments are being deposited around it. As it grows it incorporates potassium (potash) from the sea water and eventually ends up with about 6% by weight of potassium. Potassium is naturally radioactive, but fortunately the degree of radioactivity is in no way dangerous the content of the radioactive variety (isotope) of potassium being very low - a sample of glauconite containing 6% by weight of potassium would contain only about 6 parts per million of the radioactive isotope. However the presence of this radioactive isotope of potassium which decays to the inert gas argon means that the mineral can be dated by the technique of radioactive dating, akin to radiocarbon dating. It is because of this that we can assign actual ages (or dates) to the sedimentary rocks in which the glauconite has grown. Thus we can assign ages of about 110 and 105 million years to the Lower and Upper Greensands respectively with a high degree of confidence.

In addition to this rather academic feature of glauconite the presence of potassium in this mineral has its repercussions on human activity. When exposed to surface weathering glauconite is readily altered and breaks down with the release of its potassium. Thus the soils resulting from the weathering of the Greensands have a built in potash fertiliser which undoubtedly has contributed to Faringdon's former fame as a plant nursery centre and probably to the extensive orchards still to be found near Harwell. A nice example of natural recycling from sea water through to fresh fruit and vegetables!

Faringdon itself probably owes its existence to a tongue shaped mass of 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 two 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 fort on Badbury Hill was the first settlement of significance in the area and I suppose that gradually, as life became safer, folks moved down into what is now the town

centre. They were presumably attracted by the sheltered valley of a small stream which rises up what is now Southampton St. and which flows beneath the town centre and thence along the western boundary of the Faringdon Estate, more or less parallel to Gloucester St. into the 'lake' in the estate grounds. For much of its course the stream now flows in a culvert, particularly under the town centre and although well known to our senior residents at least, it was obviously forgotten by or more probably unknown to Transco, who recently rediscovered it to the great inconvenience of the town!

This little valley was also probably 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. Faringdon residents will recall the early 90's when the injudicious removal of stabilising vegetation at the base of The Folly hill resulted in a massive landslide which dumped a mass of mud and gravel in the town centre. We ignore our geological heritage at our peril!

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.

As already stated it is from this rock that Faringdon's famous fossils have been derived. Specimens 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, and not until nearly the end of that century did William Smith from Churchill in Oxfordshire - the father of English geology and one of the founding fathers of the science of geology – realized that the successions of rock strata that he had mapped as a practicing drainage engineer were characterised by unique assemblages of different fossils specific to an individual stratum or groups of strata. An observation which is one of the foundation stones of Darwin's Theory of Evolution and which now allows the correlation of strata on a worldwide basis and is the life blood of the fossil fuel industries (oil and coal) and hence of our modern civilisation.

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 can sometimes be even 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 look as if they were badly fired and had started to sag. The sponge zooid is a unicellular creature, about 250 of which would form a queue about an inch long. They live in a colony and secrete a porous nest-like structure through which water can circulate essential nutrients. One group constructs their nest of fibres (I suppose protein fibres) and comprise the familiar bath sponge, another group have a siliceous nest of which usually only fragments are found. The third group are 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 particularly the bullet-like belemnites, fish teeth and occasionally a piece of dinosaur (I have a plesiosaur vertebra which makes a convenient paper weight on my desk).

Although assigned to the Lower Greensand formation these particular deposits at Faringdon are generally known as the Faringdon Sponge Gravels. The rock consists of fossils or fossil fragments in a sandy matrix which were deposited in hollows in the sea floor, the result of erosion by marine currents, and the fossils seem to have been wafted in by the submarine currents which swept clean the dead debris off the surrounding sea bed. The hollows were 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 or to the south of Fernham on the high ground of Furze Hill. The rocks on the Folly and Furze Hill are iron stained sandstone.

In and around Faringdon the sponge gravel has been extracted for many years from pits, three of which are still in existence and which are all 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, 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 Roger's Concrete, 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 is now owned by a developer and is the subject of a planning application for housing. The actual SSSI is a quarry face some 3 to 4 metres in height and about 100 metres in length together the strip of land at the base of the quarry face, 5 metres in width. Recent legislation has imposed stricter responsibilities on owners of 'triple S I' sites and it is possible that the site owner will be prepared to 'gift' the site to an appropriate authority. The RIGS organisation is looking into the possibility of managing such a site through a local management group, to ensure care and enhancement of the site and managed access for researchers, students and the public. The total area of land that may become available is sufficient to raise the possibility of setting up a small nature park or reserve which would incorporate the geological SSSI.

It is hoped that this article will give readers some idea of the part that geology has played in the development of Faringdon and the surrounding towns and countryside. The siting of most of the local towns has been strongly influenced by the underlying rocks, so too has the development of agriculture. It is worth mentioning for example, that the fertile and tillable nature of the Lower Greensand rocks gave rise to vigorous nursery and market gardening in and around Faringdon until well into the last century.

Until recently most of our local towns and villages have been built of locally derived material. Faringdon itself has long been a centre of the extraction industry, the sponge gravels providing gravel for construction, as have the sand pits in and around Stanford in the Vale (exploiting the underlying Jurassic rocks), for well over a hundred years. Such is the quality of the sands from the nearby Shellingford crossroad quarry that it was even shipped to the Falkland Islands to help construct the airbase runways following the Falklands War. Fuller's Earth, found in the

vicinity of Uffington and Lambourne, was exploited for the treatment of sheep's wool for many years, and 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, some 5000 tons being 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 earlier had seen the accumulation of the sponge gravels.

At a guess I suppose that 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.

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. They provided building materials for our towns and villages, and in days past our water supply from springs and wells directly related to the interlayering of underlying permeable and impervious rock strata. Today our beautiful scenery attracts visitors to the benefit of our increasingly important tourist industry. We should value this heritage, understand it and treat it with the respect it deserves.

Footnote: The RIGS organization is a county based voluntary group, supported by English Nature and consisting of people concerned with the recognition, preservation and enhancement of regionally important geological sites. It aims to work in co-operation with other groups concerned with the preservation of the natural environment. Membership is open to all.

NJ Snelling 2002