Notes on the Geology of Crewkerne.

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CREWKERNE is favourably placed for the study of Geology, as within an easy walking distance the following formations appear at the surface:—

- CRETACEOUS
  - Chalk.
  - Upper Greensand.
- JURASSIC
  - *Oolitic.*
    - Oxford Clay.
    - Cornbrash.
    - Forest Marble.
    - Fuller's Earth.
    - Inferior Oolite.
    - Midford Sands.
  - *Liassic.*
    - Upper Lias.
    - Middle Lias.
    - Lower Lias.

These formations comprise sands, clays and limestones, that were deposited beneath the sea; and they yield, sometimes abundantly, the fossil remains of animals that tenanted the waters during these ancient epochs.

All the divisions occur within a radius of five miles, but to trace readily the upward sequence of the Liassic and Oolitic strata, it is best to cross the country from the Vale of Ilchester, through Yeovil and Sherborne, to the Vale of Blackmore. In the immediate neighbourhood of Crewkerne these strata are much dislocated by faults, which traverse the country chiefly from west to east.

Owing to these disturbances and to subsequent denudation, the outcrops of the several formations are shifted here and there, producing a good deal of local complication. Indeed, all the way from Bridport, by Beaminster to Crewkerne, the outcrops of the Oolitic strata are much broken, though their general trend is in a northerly direction. To the north-east of Crewkerne, a more powerful fault has shifted the outcrops some miles to the east, this disturbance having a considerable downthrow to the south.

Stretching across this broken and denuded series of Liassic and Oolitic strata, we find straggling masses of Upper Greensand and Chalk, that form the higher grounds near Crewkerne. These newer strata are outliers of the Dorsetshire Downs, and the springs that issue from them feed streams flowing in one direction into the Bristol Channel, and in another direction into the English Channel. But few of the faults that traverse the Liassic and Oolitic strata have affected the Cretaceous covering, and the two systems of strata are entirely discordant. Thus the Greensand and Chalk rest on the Oxford Clay at Rampisham and north of Corscombe; on the Cornbrash and Forest Marble at West Chelborough; on the Fuller's Earth at Cheddington and other places south of Crewkerne; on the Inferior Oolite near Seaborough and Wayford; on the Midford Sands near Chillington and Cudworth; and on the Lias at Cricket St. Thomas.

The relations between the several formations and the scenery are well marked. The trend of the hills formed of Cretaceous rocks is naturally independent of the other escarpments, for the earlier strata were planed down to a comparatively uniform level before the Chalk and Greensand were spread over them. Subsequent denudation, after revealing the old surfaces of the Lias and Oolites, has carved vales out of the clayey strata; while the sands and limestones, which could better withstand the forces of subaërial denudation, appear as low ridges or gentle escarpments and knolls.

The lowest limestones of the Lias do not appear within our area, only the higher beds of Lower Lias Clay which form the Vale of Ilchester come within reach near Martock and Puckington. They merge upwards into the micaceous shales and sands of the Middle Lias, which form an escarpment on the south side of the vale; and along this tract, as at Tintinhull, many orchards flourish, and the district is famed for its cider. Following the dip-slope of this escarpment, we find the thin rock-bed or Marlstone of the Middle Lias, and although this bed is sometimes but 18 inches in thickness, it is a tough iron-shot limestone that is serviceable as road-metal, and has therefore been quarried in many places. The shallow quarries usually display a few feet of the basement-beds of the Upper Lias, pale earthy limestones; and both these and the Middle Lias rock-bed are rich in organic remains. It is unnecessary to refer in particular to these strata, for they have been fully described before this Society by Charles Moore.[1] It may be sufficient to mention that the beds are shown at Tortwood Hill near Ilminster, at Boxtone Hill and other places near Shepton Beauchamp, near South Petherton, and Norton under Ham Hill; at these localities many fossils may be obtained, and here and there also we may procure the yellow nodules of argillaceous limestone (Upper Lias), like those from which Moore obtained the fine series of fossil fishes, as well as remains of Saurians, now preserved in the Bath Museum.

The higher beds of the Upper Lias, consisting of clays and micaceous sandy shales are rarely exposed, but there are sections near Yeovil that show their gradual passage upwards into the Midford Sands. These Sands indeed form passage-beds between the Lias and the Inferior Oolite, and they have locally been termed the Yeovil and Bridport Sands. Broadly speaking, they include in upward succession the zones of *Ammonites jurensis* and *A. opalinus*, and attain a thickness of about

[1] *Proc. Som. Arch. and Nat. Hist. Soc.*, vol. xiii, p. 119.

150 feet. The lower beds are more or less argillaceous in places, and, as with other conformable strata, there is no definite plane of separation between the Upper Lias Clays and the overlying sandy series. From the lower beds at White Lackington, Mr. S. S. Buckman obtained specimens of *Ammonites jurensis*, *A. insignis*, and *A. dispansus*.[2]

In mass the Midford Sands comprise buff micaceous sands, with indurated layers and nodules of calcareous sandstone; some of the harder bands in places are largely composed of comminuted shells, and these are developed in the upper part of the series, coalescing to form the famous building-stone of Ham Hill.[3] Of this fine yellow freestone, most of the halls and churches of the neighbourhood are built. Similar stone has been quarried west of North Perrot church. It yields fragments of *Pecten* and *Ostrea*, and other fossils may occasionally be found.

At Crewkerne itself these beds, forming the higher portion of the Midford Sands, are represented by sands with concretionary bands of sandy limestone, and by loamy sands and marl, that yield in abundance *Rhynchonella cynocephala*, *Terebratula oolithica*, and a variety of *Waldheimia carinata*. Other fossils too are found, including *Ammonites*, *Nautilus*, *Belemnites*, *Myacites tenuistria*, *Pecten demissus*, *P. lævizadiatus*, *Trigonia*, and *Serpula tricarinata*. Many of the Brachiopoda were first brought into notice by Mr. Darell Stephens, and they have been described by Davidson and others.[4] The beds are well shown in the railway cutting west of Crewkerne station, where they are overlaid by the Inferior Oolite, and brought abruptly against the Fuller's Earth on the north, by a fault that crosses the railway in an oblique direction.

[2] *Quart. Journ. Geol. Soc.*, vol. xlv, p. 450.

[3] H.B.W., *Proc. Bath Nat. Hist. Soc.*, vol. vi, p. 182; and Buckman, *op. cit.* p. 448.

[4] *Proc. Dorset Nat. His. Club*, May, 1877; and S. S. Buckman, *Ibid.*, vol. iv, 1883.

The same fossiliferous beds in the upper part of the Midford Sands are shown in deep cuttings on the old Chard road west of Crewkerne; between Crewkerne and Haselbury; and by the lane leading to Little Silver, between High Cross Hill and East Chinnock; and again at Stoke Knap near Beaminster.

Leaving these higher sandy beds, which belong to the zone of *Ammonites opalinus*, we come to the fossiliferous limestones of the Inferior Oolite. These beds are exposed in a number of quarries near Crewkerne, Misterton, and Haselbury, where they are quarried for lime-burning, for rough building purposes, and for road metal. Probably the full thickness of the bed does not exceed 25 feet.

The lower beds consist of hard sandy and shelly limestones, with one or two layers of iron-shot limestone; and these are overlaid by paler oolitic limestones. The lower beds are seldom more than five or six feet thick, and they are usually grouped in the zone of *Ammonites Murchisonæ*. This species, together with *Lima Etheridgei*, *Isocardia cordata*, and *Waldheimia anglica*, are recorded from Haselbury by Mr. W. H. Hudlestone.[5]

In the railway cutting west of Crewkerne, these lower beds are partially concealed, but they may be examined in places; and here, as elsewhere in the neighbourhood, they are especially rich in Lamellibranchs. A quarry south of Misterton afforded many species, including *Astarte excavata*, *Ceromya concentrica*, *Cucullæa*, *Gresslya abducta*, *Gryphæa sublobata*, *Lima pectiniformis*, *Pholadomya fidicula*, etc., as well as Brachiopoda and other fossils.[6]

It seems most probable that both zones of *Ammonites Murchisonæ* and *A. Humphriesianus* are represented in these lower beds, although the latter species, so far as I am aware,

[5] Jurassic Gasteropoda, *Palæontograph. Soc.*, p. 40.

[6] The above-mentioned species, and those noted in the sequel, were identified by Messrs. G. Sharman and E. T. Newton.

has not been obtained in the neighbourhood of Crewkerne. The Inferior Oolite, however, exists in an attenuated form, compared with its development in the Cotteswold Hills, and on this account the fossils preserved in its several layers are more plentiful, as a rule, and more varied. Owing to the paucity of sediment, the fossils are not preserved in such distinctive beds as we find in parts of Gloucestershire, and the zones here, as near Bridport, become to a certain extent interblended.

The upper beds of the Inferior Oolite are more clearly to be distinguished. They are shown in the railway-cutting at Crewkerne, and in a quarry near the railway-station. There rubbly pasty and shelly limestones, obscurely oolitic, are shown to a depth of 10 or 12 feet. They contain some fossils, such as *Lima pectiniformis*, *Pecten demissus*, and *Terebratula Phillipsii*, found also in the lower beds; but they are characterized by the presence of *Ammonites Parkinsoni* (to which zone they belong), and by the occurrence of numerous Sea-urchins, such as *Collyrites ovalis*, *Clypeus Agassizi*, and *Holectypus hemisphæricus*. *Terebratula sphæroidalis*, *T. Stephani*, *Rhynchonella spinossa*, etc., may also be found.

Resting on the Inferior Oolite we find the Fuller's Earth, a formation consisting mainly of clay or marly clay, with, near the middle, bands of pale earthy limestone, known as the Fuller's Earth Rock. No Fuller's Earth *proper* is known to occur in the district, the beds of special economic value being obtained from the formation near Bath.

At Mr. Lye's brickyard at Crewkerne, the Fuller's Earth clays are worked for making bricks, tiles, and drain-pipes, and here the beds are seen resting on the Inferior Oolite, and faulted against the Midford Sands. Thus a useful assemblage of strata is met with in one series of openings, the sand being serviceable to the brick-makers, and the limestone being burnt into lime for mortar. It will be noticed too, that the Inferior Oolite limestone occurs in more solid blocks beneath the clay

covering than it does where exposed to the influence of the atmosphere.

A few fossils may be obtained from the clay, such as *Belemnites parallelus, Ostrea acuminata, Waldheimia ornithocephala,* and *Rhynchonella varians.*

There is another brickyard in the Fuller's Earth, by the tunnel west of Crewkerne railway-station, and the clay is also exposed in the cutting before mentioned. It contains little concretions of carbonate of lime, known as "race."

The Fuller's Earth Rock has not been traced persistently in the country west of Crewkerne, but it was observed by Mr. W. H. Bristow near North and South Perrot. Good sections are to be seen eastwards, near Thornford.

No traces of the Great Oolite occur in this district. The Fuller's Earth is overlaid directly by the Forest Marble. It is possible that the Great Oolite may be to some extent replaced by the upper beds of the Fuller's Earth, but the absence of the formation may be due to a certain amount of unconformable overlap.[7]

The Forest Marble consists of clays and shales divided by flaggy and false-bedded shelly limestones. The limestones are largely made up of broken shells of *Ostrea,* etc., and they are usually oolitic. At Long Burton, near Yeovil, these beds have been polished for local use in chimney-pieces, etc., but the stone is not well adapted for the purpose, for it contains ochreous galls and often a good deal of lignite. It yields a durable road-stone, and has been used for building purposes, and paving. The fossils include *Ostrea Sowerbyi, Pecten annulatus,* etc.

The junction with the Fuller's Earth is rarely to be seen, but on the Dorset coast the base of the Forest Marble is a rich fossil-bed crowded with specimens of *Rhynchonella, Terebratula,* and other fossils that link it with the Bradford Clay

[7] H.B.W., *Geol. Mag.*, 1888, p. 467.

of Wiltshire. The harder limestone beds of the Forest Marble stand out in bold escarpments, as may be seen near Halstock, Pendomer, and Hardington.

The Cornbrash is a rubbly earthy and shelly limestone, with softer marly layers, and it is usually rich in fossils. *Ammonites discus* is occasionally found, but the most abundant species comprise *Avicula echinata, Gresslya peregrina, Isocardia minima, Modiola Sowerbyi, Pecten vagans, Rhynchonella concinna, Terebratula intermedia, Waldheimia lagenalis, W. obovata,* and *Echinobrissus clunicularis.* Fine collections were made by the Rev. H. H. Wood, and by the Rev. E. Bower of Closeworth. The Cornbrash is burnt for lime, and it has been employed for building purposes at East Coker.

The Oxford Clay, as previously noted, has been observed within a few miles of Crewkerne. It forms the vale of Blackmoore, and is exposed in various brickyards near Melbury Osmund and eastwards.

Of the Upper Greensand and Chalk that form the higher grounds on the south side of Crewkerne, we have but little detailed knowledge. The Upper Greensand comprises green, grey, and buff sands, surmounted by hard cherty layers. *Exogyra conica* is abundant in the sands; and *Pecten Asper,* and *P. quinquecostatus* may usually be found in the chert beds.

At the base of the chalk there is usually a rich fossil-bed known as the Chloritic Marl. This bed is well shown near Chard, where it yields *Ammonites rothomagensis, A. varians, Scaphites æqualis, Turrilites Wiesti,* and many other species.

These Cretaceous beds would no doubt repay a thorough examination; and it is probable that representatives of the Gault will be found at the base of the Upper Greensand. To the local geologist no more interesting task could be recommended than the mapping of the various strata on the Ordnance maps of the scale of six inches to a mile. The original geological survey of the district around Crewkerne

was carried out by Mr. H. W. Bristow, more than forty years ago; for his Map was published in 1850. The Upper Lias at that time was not considered of sufficient local importance to be separately mapped; and emendations are needed in the tract of ground extending from Berwick or Barwick by West Coker to West Chinnock and Merriot. The main features in the geology were surveyed with great care by Mr. Bristow, but of course the better and larger maps now procurable will enable the geologist to depict the structure of the country in closer detail.

The district is one almost bare of superficial accumulations. The higher courses of the streams contain but narrow strips of Alluvial debris. The slopes of the uplands are strewn in places with detritus of chert from the Upper Greensand, and occasional quartz pebbles are found in the soil over the Oolitic tracts. As a rule however, the soils and agricultural characteristicts are directly dependent on the nature of the substrata.

The Lower Lias clays of the Vale of Ilchester form rich pasture lands, and in that area much Cheddar cheese is made; on the slopes along the outcrops of the Middle Lias shales we find land occupied by orchards, and on the higher grounds of Middle Lias we find a mixture of arable land and pasture. Again, when the clayey beds of the Upper Lias spread over the Marlstone we find vales, as between Chillington and East Dowlish, suitable again for meadow and pasture. The higher lands of the Midford Sands, which rise in little isolated knolls beyond their main outcrop, are fertile tracts, for the beds are more or less calcareous; and here again we have a mixture or arable and pasture land, much good barley being grown in places. The Inferior Oolite decomposes into brashy argillaceous soil, on which wheat and other crops are grown. The Fuller's Earth, which forms a vale between Crewkerne and Pendomer, is naturally a cold and infertile clay, but this heavy land, by draining, may support good timber and thick

hedgerows, while the pastures near Mosterton support dairy-farms, and good Dorset cheese is made.

Much of the land occupied by the Forest Marble is heavy, but it affords mixed soils, on which corn is grown, while much is devoted to pasture and meadow. The Cornbrash, as its name implies, is mostly under arable cultivation, while the Oxford Clay again is largely devoted to grass land. On the Upper Greensand there are fertile tracts of timber, pasture, and arable land; but the ground, as a rule, is less cultivated than that of other formations, and much of it is left for the gorse. The Chalk affords some variety of soils, the lower strata more especially being under arable cultivation, while the higher beds form open downs and sheep walks.[8]

One other point of interest may be mentioned.

Between the villages of East and Middle Chinnock there is a spot marked "Salt House," on the Ordnance Map; and it is said that East Chinnock "is famous for a salt spring, from which salt was formerly made in considerable quantities."[9]

[8] See J. Buckman, *Geology and Agriculture of Dorsetshire. Bath and West of England Agricultural Journal*, vol. xiii.

[9] G. P. R. Pulman, *Local Nomenclature*, 1857, p. 133.