

Geology of Somerset.

BY MR. W. BAKER.

I COME before you as one of the representatives of the natural history department of this society, to offer a few observations on the most striking geological features of our highly interesting field of research,—the beautiful county of Somerset.

The course which I have laid out for myself is, to pass from the oldest formation, in the order of geological time, to our rich alluvial lands, which are now in a state of accumulation; and to offer a few brief remarks on the features of the principal formations, merely to open the way for future papers of detail, on the numerous interesting portions of the province, which we now call our own.

More than thirty years ago, a young member of our very oldest geological family,—syenite—was observed at Hestercombe, one of the extended branches of the Quantock-hills, and the fact recorded in the transactions of the London Geological

Society, by Leonard Horner, Esq. late president of that society.—This discovery indicates that granite may be found in other parts of our western district.

The Quantocks, and the hills farther west, are the transition, or grauwacke, formation, and are of the lowest sedimentary deposits.

Few or no organic remains have been found in the grauwacke of Somerset, but some are known in the same class of rocks in Devon and Cornwall. In our hills, however, we have numerous beds of limestone, rich in madrepores, corals and encrinites. This limestone is much quarried for manure in several places. Weather-worn, or polished specimens, are interesting for geological cabinets. They are richly colored,—yellow, red, brown, pearl-grey, and almost black. Copper has been obtained in considerable quantities in the Quantocks, but not sufficient to pay for working. Mining operations have been carried on at Broomfield and Doddington. At Broomfield, the ore has been obtained as a rich yellow sulphuret, associated with quartz and grauwacke; and at Doddington, as green and purple malachite in coraline lime-stone. Rich and beautiful specimens of these ores are to be seen in the cases in the society's rooms at Taunton. Iron ore is found in those hills, but more abundantly in the western hills.

It is probable that in former times, perhaps as long ago as when the Romans exercised military sway in this country, and improved the knowledge

of our forefathers in many of the arts of life,—iron was smelted on our western hills; for charcoal scorïæ, and fragments of crucibles, mixed with iron ore, are found in the Brendon hills. The almost insulated Cannington park is marked in the Ordnance map as one of the subordinate limestone beds of the Quantock hills, although so far removed from them. Mr. Horner in his geological survey of the western part of Somerset, says “Cannington park is composed of a highly crystalline limestone of a pearl grey color, having a very close grain. I examined it with very great care, in order to discover whether it contained any organic remains, but I could not find the slightest trace.” * * *

“It is very probable that by a more minute examination, madrepores and shells may be found in this limestone; for it certainly has very much the appearance of what is called transition limestone.”—We now know that corals and encrinites are readily found there.

The beautifully wooded and watered combes of the grauwacke hills are widely known, and so are their lofty eminences* which command extensive and magnificent prospects.

*Dunkery Beacon	1697 feet.
Haddon Hill, (near Dulverton) ...	1140
Culbone Hill, (Porlock)	1211
Grabbist, (Dunster)	906
North Hill, (Minehead)	1059
Willsneck, (Quantock)	1270
Douseborough ,,	1022
Cothelstone ,,	1066

The Mendip Hills, extending from the neighbourhood of Frome to the Bristol channel, come next in geological age. The prevailing rock is carboniferous or mountain limestone, resting on the old red sand stone, which protrudes through the limestone at some of the highest parts of the district. Various conglomerates and sandstones make up large portions of this series of rocks. The limestone contains numerous species of molluscous shells, besides corals and encrinites.—These hills have undergone mighty disturbances, as is exemplified in the stupendous Cheddar cliffs, and in the romantic Brockley, Goblin, Burrington and other combes.

The insulated rocks, Steep Holmes and Flat Holmes, seem to have been broken off from the limestone hills of the Mendip district, and the corresponding carboniferous strata of Wales, at one of those sublime movements by which God has been pleased to prepare the world as a habitation for the widely extending family of man.

The grand scenery of Cheddar cliffs can hardly be surpassed in the kingdom, and the rocky combes of Mendip have a romantic beauty, widely different from the calm richness of those of Quantock and the more western hills. The caverns of Mendip are interesting and wonderful, as the tombs of numerous animals, many of which are fortunately now extinct.—In that at Uphill, the Rev. D. H. Williams of Bleadon found bones of rhinocerus, hyæna, bear, ox, horse, stag, fox, and of many small

animals, and of birds. In Hutton cavern have been found bones of elephant, tiger, hyæna, bear, wolf, horse, hare, rabbit, fox, rat, mouse and birds. In Banwell cavern,—buffalo, deer, wolf, bear, fox, mouse or bat. We see in these vestiges that formidable creatures once inhabited our beautiful country, but doubtless at so remote a period, that we may believe the highest order of inhabitants,—man, had little or no possession here; and that therefore the beasts had to strive for supremacy only amongst themselves.

In the Mendip hills are some good examples of trap or volcanic rock. At the eastern side of the railway cutting at Bleadon, there is an interesting example of a downward bend of lias strata, running apparently under mountain limestone, which has been disturbed by the trap.—Lead, calamine, and other metals have from distant time been obtained in the Mendip hills, but mining operations have not been carried on, on a grand scale, at any period.

The coal formation comes next in geological order. All the coal fields of Somersetshire are north of the Mendip range.—Mr. Rutter in his “Delineations of the north western division of the county of Somerset,” remarks that “the seams of coal, throughout this district, are comparatively very thin, their aggregate thickness in any single coal pit scarcely exceeding that of one of the ordinary seams in the principal coal fields in England. The district may however be considered rich

in this valuable mineral, and as able to answer largely the future demand. Many of the ancient pits may be drained and worked to advantage, on the present improved system. No coal has been found south of the Mendip range; but since the mountain limestone dips beneath the marshes, towards the Quantock hills, it seems probable that there exists an intermediate basin beneath the red marl, which forms the uppermost sub-stratum in this alluvial tract."

This information Mr. Rutter says he obtained chiefly from Buckland's and Conybeare's observations on the south western coal district of England.

How wonderful is the providential care for man, which is exemplified in the vast stores of coal, preserved from the exuberant vegetation of an early era of creation, to be opened at the times when they were especially required!—In the early period of man's abode on earth, indeed in the early times of most nations, forests supplied fuel; but as multitudes of the human race spread over the world, and their wants increased, they were directed to the stores which had been so marvellously preserved for them.

Philosophers have anticipated the exhaustion of some of the coal districts, and speculated on the inconvenience that will arise; others encourage us with a hope that, before this time shall have arrived, more refined, less dangerous, and less laborious means of supplying light and heat for all our increasing wants, will have been discovered.

New red sand stone comes next in order, being the overlaying rocks of the coal measures. In Somerset this is an extensive and varied series of deposits; it is derived from the disturbed strata of older formations, and known as grauwacke conglomerate, magnesian conglomerate, red marl and red sand. Several varieties of these rocks are strong features of the grauwacke district, and the magnesian conglomerate, or dolomite, forms an important part of the carboniferous and coal districts. These rocks are made up of angular fragments of contiguous strata; or of such as have been brought by the action of water from a moderate distance, and are slightly abraded; or of thoroughly abraded fragments, as those are which compose the shingle bank, the boundary of the channel from Stolford to Sherton. In the western district, many of these rocks contain pebbles of limestone in great abundance, and are called popple rocks; they are extensively worked for lime in many places.

In the neighbourhood of Milverton and Wiveliscombe, the limestone in the conglomerate beds is much worn by abrasion, and they contain such fossils, and have such other characters, as may lead geologists to look to the spaces between Mendip-hills and the Holmes, as the localities from which these water-worn pieces of carboniferous lime-stone rock were derived.

Mount Radford, near Bridgwater, is composed of drifted sand, and small and large rounded and

angular fragments of grauwacke from the Quantock hills, with scarcely a trace of limestone. The gravel which elevates Bridgwater a little above the alluvial land, is rounded, and was probably washed from the Quantocks also; it rests on the red marl, the immediate substratum which extends through so large a part of our county, underlaying the rich levels of Bridgwater, Brent, and Yatton, the Vale of Taunton Deane, as well as many of the smaller vallies, and our lias, green sand and other hills.

Lias is an extensive formation in our district, resting conformably on the new red sand stone.—It forms hills of moderate elevation between Taunton and Somerton, and the Polden hills, from Langport to the river Parret at Pawlet.—It makes the bed of the river at the passage at Combwitch, rises again at Hill in the parish of Otterhampton, and extends in a narrow belt bordering the coast to Blue Anchor. The lias extends no farther westward, except a small patch six miles beyond, at East Lynch.

The cliffs of the coast from Sherton Bars to Blue Anchor are of lias, and its associate, red sand stone, which contains much gypsum between Watchet and Blue Anchor. They present numerous instances of disturbance in curious curvatures and faults, and there are good examples of bold elevated rocks. The features of these rocks, however, undergo frequent changes, by the waves washing away

at the base, and bringing down large masses, from time to time, at no great intervals. The strata of the beach are much contorted; Mr. Horner in his geological survey before alluded to, says, "It would be impossible by any description of particular instances of disturbance, to give an intelligible representation of the extraordinary appearance of the coast, in walking over it at low water. I cannot better convey an idea of it, than by comparing it to the great waves of the sea suddenly consolidated. These waves now broken in many directions exhibit various sections of their internal structure."

The lias of our district is not so rich in organic remains, I believe, as the same formation at Lyme Regis. However, ichthyosauri and plesiosauri have been found as nearly perfect skeletons, those from the vicinity of Street and of Watchet being probably the most perfect. Bones of pterodactylus have also occurred. Pentacrinites, echini, ammonites, and nautili, and numerous species of bivalve and univalve shells are abundant. On the beach near Blue Anchor are multitudes of compressed ammonites, having the beautiful iridescent nacre. The bone or coprolite bed has been found, I believe, wherever the lower strata of the lias have been reached.

The different members of the oolite formation extend across the eastern part of the county, from the neighbourhood of Castle Cary to that of Bath. Inferior oolite caps the lias hills of Dundry, Glas-

tonbury, Brent, &c.* Fossils are very abundant in these beds.

The upper or green oolite is extensively worked in the vicinity of Bath.

The green sand hills called Black Down, are a striking range, bordering the county, south of Taunton and Wellington; their peculiar outline attracts the eye from distant parts of the county.

Although there is very much that is interesting in these two last formations, we must pass lightly over them.

The alluvial lands of our county are very extensive, and proverbially rich. The extended levels opening on the Bristol channel have doubtless been estuaries in recent geological time. Sand banks, parts of former sea-barriers, elevate above the surrounding land Westonzoyland, Chedzoy and other villages, and their valuable corn fields; they prove their comparative late formation by the multitudes of shells which they contain, all of species now living on our coast, and many of them retaining their colour and markings. The lower part of the humerus of a young mammoth has been found at Chedzoy.

Under the rich soil of our levels, beds of peat occur at different depths; they also form the surface of extensive tracts of our county. The Sedge-moors are fast emerging from their morass-like state, and cultivation is spreading widely over them.

* These require further examination; perhaps upper lias may be here.

Our peat bogs at the Burtles still retain much of the wild character of morass; they have been extensively cut for fuel, and now cultivation is gradually doing its beneficial work here also. The botanist and entomologist still find them interesting fields of research, and our friend, Mr. Stradling, has informed us of their antiquarian interest. Beds of peat occur in the clay pits and other excavations near Bridgwater, from twelve to sixteen feet deep, and contain bones of many kinds of animals, horns, shells, and trunks of trees. Similar animal remains, and even pottery, were found by the late Mr. Anstice and myself, mixed with sand, flints, grauwacke, and other gravels, nearly thirty feet beneath the surface, at the old canal basin at Huntworth. Our alluvial lands must be constantly, though slowly, increasing in elevation, as our rocky shores are always wasting. Every inland flood brings down from the hills new material, and in dry weather, when the wind is from the sea, sand is blown from the extensive flat beaches at Burnham, Berrow, Weston, &c., against the sand hills and to the land beyond. When the sun is bright and the breeze favourable, a dried stratum of sand is thus taken up and carried off in light clouds at intervals of about five or ten minutes. When the tide is out, the weather calm, and the sun bright, a dense vapour just covers the beach, and has all the appearance of water at particular parts, producing sometimes the interesting spectacle—mirage.

The following extract from the excellent little book "The Earth's Antiquity, by the Rev. J. Gray," will be in place here. "Treasured in the earth's indurate bosom are medals of creation. A new sense is, as it were, added by geology to man, conveying a before unenjoyed perception of beautiful existences. Scenes previously unappreciated, are now through this newly opened avenue, happily appropriated, and where we hitherto saw only sterile vacuity, there now spring forth to view bright and monitory things. We hear sermons in stones! what is now every mountain range, and swelling hill, that rises before our view? Not, as heretofore, a mere amorphous mass of senseless rock; it is a sanctuary of an Almighty workmanship, elaborated with a skill inconceivable and sublime, through the revolutions of countless time! What is now every chasm, dipping into the secluded recesses of the fractured earth? Not as heretofore, a mere empty, rocky cavern, but a fully tenanted sepulchre of long past races of living beings, which bespeak a Creator no less omnipotent than allwise! He it is who from the beginning hath laid the foundations of the earth, and the whole sustentation of the varied creations thereof has been the sole work of His hand."

However irrelevant such general views may be in an attempt to portray the geological peculiarities of a country where some prevailing formations engross the attention and restrict the labours of

man ; such views are singularly applicable to any consideration of the geology of the county of Somerset. It is our privilege to reside in a district where geological extremes meet ; where those varieties which are generally separated by great distance, are brought within the range of almost immediate inspection. We are within reach of the lowest formations, and of the latest, while the caverns of the Mendip and the Quantock ranges enable us to contemplate the brilliant results of crystallization, and the astounding remains of animals no longer denizens of England or of Europe. It may indeed, without any undue partiality for this favored county, be permitted us to question, whether there is any spot of equal dimensions on the surface of our planet, where the relative progress of creative energy is more distinctly unfolded, or the bounties dependant on geological distribution more varied or profuse.

At all events we shall be justified in concluding, that there is not any known locality which affords greater facilities and inducements to the patient humble-minded student of nature, or more decided manifestations of the measureless bounty and power of the Creator.