The PRESIDENT said no county history could be perfect unless access could be had to volumes like those published by the Somerset Record Society.

Mr. SANFORD then delivered, as follows,

## The President's Address.

I cannot but feel highly honoured by your having conferred on me the office of President of this Association. My predecessors in this office have been men of high attainments, and high position. I do not feel that I have done aught which could entitle me to such a distinction, especially as it is now conferred for the second time.

Last year we had to deplore the loss of two Members of this Society, whose work had been of great value to us. But during the past year our loss has been severe indeed.

A man like Edward Freeman, who has devoted a life to the investigation of history in a spirit, too rare among historians, of ascertaining absolute truth independently of previously formed theories, and of previously acquired political opinions, and of expressing those truths in clear and unmistakeable language; such a man stamps the literature of his age with a character which is invaluable to posterity, and the books which he writes form a standard by which future work will be judged, to fall short of which, will be to fall short of that which distinguishes the true historian from the historical romancer.

Edward Freeman was one of the most faithful and most useful Members of this Society that ever worked with it since it was formed. He seemed thoroughly to enjoy attendance at the meetings; and his learned and exact criticism, founded on a thorough knowledge of the subject, made him perhaps, after Professor Willis, the best critic of ecclesiastical architecture that existed in his time. These two men, Willis and Freeman, taught more of the real spirit of pointed architecture than probably any others, and the privilege of listening to Freeman made our Society one of the best schools of architecture in England.

It was not only as an historian and architectural critic that Edward Freeman was valued. The kindly feeling which shone through the somewhat rough exterior, endeared him to all who could penetrate the rind. A firm and sympathetic friendship, a cordial recognition of work in other men, however inartistic or slight it might be, provided only that it was honest, were clearly as characteristic of the man, as ever was his own love and fearless assertion of truth.

That we should have lost such a man from among us is sad indeed, but sadder still to us were the circumstances of his death, which must have caused great mental suffering to others besides himself; and he is buried far from home in a strange land. But his memory is ever dear to us.

Sir Alexander Hood has also passed away during the past year. His loss will be felt not only by this Society, but still more by the county at large. He had filled the office of President of the Society, and had frequently evinced great interest in its proceedings. He was an excellent archæologist, possessed a well-arranged collection of objects of interest connected with the history of the county, with many others that he had collected in other lands; and had an excellent library which contained manuscripts of historical interest, and of this he liberally gave the use to those who wished to investigate the subjects it illustrated. His memory too, we shall long cherish.

I fear there is but little of archæological interest in this neighbourhood, and of that little much has to be sought out among alterations of houses and churches which conceal and deform the traces of old work that may still be found. I will not enlarge on this subject, as it can be more properly treated, as we go round the district, by those who understand it.

I will only call attention to what I think you will consider an honest and faithful reparation of an old church, with an apparent history written on its stones, in the parish associated with Wellington, namely, West Buckland; and this is the more

praiseworthy for the repair has, with the exception of a small portion, been executed under the superintendence of a local architect. We have, perhaps, some remains of pre-historic earthworks in the neighbourhood : one certainly is so slight that I think it would escape the eye of any but a perfect expert.

When we come to pre-historic remains, we come to a period between which and quaternary geology there is really no clearly defined line. The works of man are found in both, and if we take the whole world we find an overlapping of the different stages of civilization which has extended even to our own day. The extinction of races of animals means a different thing, and points to a different date in nearly every country we examine. It may be convenient in one country, perhaps, to commence the pre-historic period with the introduction of some particular form or material for tools and weapons, or with some apparent change in the mode of life, say from the troglodyte hunter to the tent-making herdsman, or the agricultural lake-dweller. We may end the quaternary with the extincton of the mammoth or the Irish deer; but the same reasoning will apply to the Dodo or the Rhytina. But wherever we take the boundary it seems to be an artificial one, and applicable only to the country to which we originally apply it. It will therefore be more convenient to take the oldest rocks we have in any given neighbourhood and work downwards, and see what considerations we have for discussion.

The main geological features of this part of the country are furnished by the great trough of the palœozoic rocks which extends from this point to the Bristol Channel, bounded to the east by the Quantocks, and to the west by the Brendon Hills. Both of these masses are, roughly speaking, of the same age, the northern portion being old Devonian, the oldest part being possibly contemporary with the newest Silurian; and the newest, to the southward, being Carboniferous, which is to a great extent nearly conformable to the older strata. At least

there does not appear to be any well-marked break in this great mass of strata, though the line of the demarcation is pretty well ascertained.

The bottom of this trough is covered by newer rocks. The higher Carboniferous rocks are probably absent, and there is, I believe, no trace of rocks of the great Permian period, which, in other localities are found to rest immediately on the Carboniferous. The red sandstones on which we live are of Triassic date, and are classed in the geological maps as belonging to the older of the three formations into which rocks of that period are usually divided, namely, the Bunter. These rocks not only fill the bottom of the trough, but spread over the Palœozoic rocks to the south and east, as far as Exmouth, and beyond Crediton. These are covered to the east by a younger member of the same Trias, the Keuper, and are usually rather soft, but sometimes more compact sandstones of a deep red colour. These pass into greenish grey sandstones in places, and in the Keuper we have beds of clay, generally red, which is used for excellent bricks, but it sometimes becomes green or blue, and in places has quite the appearance of a lias clay. A band of coarse conglomerate, evidently an old Triassic beach, consolidated with a magnesian limestone cement, contains pebbles, mostly of limestone, which is probably of Devonian or Carboniferous date. In many cases, the age of the rock forming these pebbles can be fixed by the well-preserved fossils they contain. The sandstone itself contains fossils in very few localities, but they are sufficient to fix the age of its formation. The Keuper is covered on the line of the Blackdown hills, and further to the southward by newer rocks of the lias to the east, and with Neocomian sands to the west, which form the escarpment of these hills above the whole length of the vale of Taunton, ending to the west in the escarpments which contain the well-known Whetstone quarries above Broadhembury, and in these are contained a great variety of most beautiful fossils preserved as exquisite flint casts.

The whole of these beds, except, perhaps, the Neocomian rocks, are covered here and there by streaks and patches of gravel of different dates. Some of these I suspect are old, and perhaps river gravels of even tertiary date, when even small streamlets flowed at heights far above their present level; others, containing the remains of extinct mammalia, mammoth and bison, and perhaps other animals, are, as far as I know, only found at lower levels, some even below the level of the present river beds. I have never seen from this immediate neighbourhood any remains of the palœolithic flint implement which are at all certain; but occasionally small chips of flint occur, which may have been used as arrow heads, and the armature of spears, and cutting or hammering tools, but they are of that rough and inartistic type which we find in use in Australia, and which cannot be distinguished from stones accidentally broken. In the fissures of conglomerate limestone the remains of animals sometimes occur. One which resembles part of a quaternary animal is a piece of the horn and part of the foot of a very large deer, which may be compared in size with the wapiti, but it is perfectly unmineralised, so that its age is uncertain.

This slight sketch of the geology of this part of the country will, I hope, be filled up by the able geologists who have honoured us by their presence. I have purposely omitted some points, such as the occurrence on the shore of the Bristol Channel of the small downthrow of lias, and the recent variations of level, to which are due the occurrence of mammoth in what was probably a forest bed, which is now for the most part submarine. These I leave to others to explain as they may think best,

Two great subjects which now excite the interest of geologists, can be illustrated to a certain extent in this neighbourhood. One is the probable extension of the coal supply, and the other concerning the ice age or ages.

With regard to the first of these, the carboniferous rocks in this part of the country, can I think be hardly older than the

middle of the great coal period. There are some very slight traces of coal, in beds hardly thicker than paper, in the neighbourhood of Stawley; and a few plants occur in the Westleigh quarries, shewing that during the formation of these rocks there was dry land absolutely present, for a short time at least, in the immediate neighbourhood. Is there any probability that this dry land was of sufficiently long continuance, to the south of the disappearance of the Palœozoic rocks beneath the Mesozoic strata, for coal forests to have grown upon it previous to the great dislocation of the whole of the coal strata in the Somerset field, which took place long before the close of the great coal epoch? I am not competent to give an opinion on it, but I believe Mr. Ussher has given much attention to this part of the subject, and I hope he will be able to give us facts which may bear on it. I confess I shall be surprised if his opinion encourages us to repeat the experiment here which has been successful in south-east England; for I suspect that if we did bore here, we should bore down on highly disturbed and folded strata, so that even if a coal field ever existed in these strata, which is exceedingly doubtful, it would be present either in exceedingly small surfaces or sharp upturned edges; and these would bear so very small a proportion to the surface of the country, that our chances of hitting the coal would be so very small, that we must not think of incurring the great risk with our present sources of information. If however coal is found to the west and south of the Mendips, and it is found by the strike of the beds and their apparent thickness that they trend in this direction, our posterity may at some remote time risk the expense and make the experiment.

With regard to the second of the great geological questions to which I referred, it may perhaps be in the memory of some, that many years ago I called the attention of this Society to the work Mr. Croll was doing in the attempt to solve the question of the cause of the ice age by astronomical investigation. I think some of the professional geologists rather laughed at

the idea. Now, though Mr. Croll did not completely solve the problem, owing to a serious mistake in one of the assumptions used as the basis of his calculations (and in this mistake singularly enough he was followed by Sir John Herschel), he had, it now appears, hit the right nail on the head, though not exactly in the right direction to drive it home. This feat has now been performed by Sir Robert Ball, who has clearly shown us that not only is there a real cause for an ice age, in the direction in which Mr. Croll had sought it, but that astronomical causes, and even those alone, must necessarily from time to time produce an alternation of cold and genial periods: that the cold thus indicated must at times be exceedingly severe, alternately in the northern and southern hemispheres, and that in such cases they must alternate with periods of a spring-like temperature throughout the year. The whole of this great alternation of seasons depends on the precession of the equinoxes, and consequently in the well-known cycle of about 21,000 years; the severity of the cold seasons depending on the varying ellipticity of the earth's orbit. This can probably be calculated within certain limits of accuracy. At present we are past the midsummer of this great year, 10,500 years hence or a little less, we shall be in the midwinter. The difference in the seasons, then, would probably be considerable, but perhaps not excessive, as the winter then would only be seven days longer than it is now. If the ellipticity of the earth's orbit were as great as it has been, and will be again, the difference between winter and summer might be as much as thirty days or more. There is no reason to suppose that the whole average heat received by the earth from the sun would vary to any great extent in amount in any given series of years, and it is clearly and absolutely shown that the whole heat received during the summer and winter respectively in either hemisphere bears an absolutely fixed ratio to the whole heat received during the year, whether the seasons are long or short. It will be at once seen that in the long winters the heat will have to

be divided among a much greater number of days than in the short ones, and that consequently the heat per day will be much less. It is this heat per day which causes the winter to be mild or cold. This difference, under known circumstances, would be so great as to produce the climate of Greenland in this country ; for the heat produced in the short summer would not be sufficient to melt the ice accumulating in the winter. I merely give this little sketch in order to get you to read Sir Robert Ball's little book, just published by Trübner and Co. in their "science series." There are no formidable mathematical formulæ to daunt you, and the subject is made as plain as it is possible to be.

I hope I have not trespassed too much on your time, and I hope we may have some original work brought before us. I know that many members of the association wished that this meeting should depend for its interest on geology. I have endeavoured to give that turn to it at the commencement. I shall ask a question or two as to some details, when we come to a possible discussion on the ice age. I have left out many interesting corollaries that force themselves on one's attention, such as the probable cause of submergence which appears to have accompanied the accumulation of ice on either pole ; the cause of the assemblage, in closely connected strata, of the animals of warm and arctic climates ; and other subjects. I hope these may be treated of by those more able to do justice to them than I am.

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After luncheon at the Squirrel Hotel, the party walked to