with the laws of gravity and downhill. A glacier filling the Crum-mack Valley would move southward and the blocks in question clinging to the west side of the valley might be stranded where they are found on Norber Brow. There is no doubt that the pedestals and platforms on which most of them stand, and which vary from one to two feet in height, are due to the wasting away of the surrounding limestone rock as pointed out by Prof. Hughes and Mr. Mackintosh, but I quite agree with Prof. Hughes that more data than are at present available would be required before any reliable estimate of the time that has elapsed since the close of the Glacial Period could be worked out.

These remarks are not intended to apply to the Silurian blocks above Settle, which Phillips states are 200 feet above any similar rocks in the district *in situ*.¹ As we did not see them or test their levels, any remarks of mine would be superfluous.

III.—THE LOWER CRETACEOUS SERIES OF THE VALE OF WARDOUR.

By A. J. JUKES-BROWNE, F.G.S., and Rev. W. R. ANDREWS, F.G.S.

IT has long been known that certain deposits of Lower Cretaceous age lay between the Gault and the Purbeck group in the Vale of Wardour, but the absence of any good open sections, along the tracts where they reach the surface, has hitherto prevented geologists from ascertaining the exact nature and succession of the beds.

Dr. Fitton, whose account of the Vale of Wardour is wonderfully good and accurate, distinctly recognized the existence both of Wealden and Vectian (Lower Greensand), stating that certain sands, containing traces of marine shells, occurred beneath the Gault and above the clays which he regarded as Wealden.

Mr. Bristow, however, when surveying the district in 1851 to 1853, does not seem to have obtained any evidence for the separation of the sands, and considered it safer to colour all the sands and clays below the Gault as Wealden until clear evidence of their marine origin could be obtained. Hence no Lower Greensand is indicated on the Geological Survey Map.

During last year we jointly resurveyed a portion of the ground on the six inch maps, and were able to obtain evidence that proved Fitton's view to be correct, and goes far towards completing our knowledge of the succession in this district.

This preliminary notice is printed by permission of the Director-General of the Geological Survey. Early in 1890 a well was sunk at Dinton, which gave us important information regarding the beds immediately beneath the Gault. The following is an abstract account of the section thus obtained.

		Feet.
GAULT	Yellow, brown, and blue clay (with fossils)	21½
	Sandy rock with a layer of small pebbles at the base (fossils) ...	14½
VECTIAN	Brown, grey, and yellow sands, with lumps and layers of ferruginous sandstone	26½
	Light grey sandy clay, becoming darker and passing down into stiff black clay	7
		69½

¹ Rivers and Mountains of Yorkshire, 1855, p. 111.

One of the ferruginous layers in the sands has yielded a fairly good specimen of *Exogyra sinuata*, which is one of the most characteristic fossils of the Vectian group.

In this well the base of the group is evidently not reached, but most fortunately it is completed by a brook section at Teffont, which begins in a black clay exactly like that found at the bottom of the well. This black clay is about six feet thick, and passes down into a nearly black sand which has a green streak when cut, and consists mainly of dark-green grains of glauconite.

Underneath this sand are mottled clays, which were recognized by Mr. Whitaker as similar to the "catsbrain" clays of the Weald, —their tints are yellow and white, mottled here and there with a rich claret-coloured stain, which imparts a special character to the clay. Below are yellow loamy clays. We consider these to be of Wealden age, and the dark sand to be the base of the Vectian; but as the section is not clear, and this sand has not yet been found elsewhere, we cannot say whether the sand is conformable to the clays or not.

The maximum thickness of the Vectian appears to be about forty feet, and the yellowish-green sands which underlie the pebbly base of the Gault can be traced westward for several miles both along the southern and the northern sides of the Vale, overlapping the Wealden and the several divisions of the Purbeck beds, and gradually thinning out.

The thickness of the Wealden clays is difficult to estimate, because exposures are so few and the slopes are so gentle; but there can hardly be more than 40 or 45 feet at the east end of the vale, and they thin out rapidly towards the west, not extending far beyond Teffont on the north side, nor far beyond Sutton Row on the south side.

Eastward the Wealden occupies a certain width of flat ground which merges into the alluvium east of Dinton Station. At the cottages north of the station a well was sunk for about forty feet through yellow-grey and brown clays. We were informed that there was a perfect succession of clays without any sudden change or any pebbly bed, but that at the bottom there was a *floor of very hard sandstone*. The accuracy of this information we proved by having the well emptied, and the bottom tested with a punch. A piece of this sandstone was given to one of us by the well-sinker, and is a hard grey calcareous grit with *Cypridea punctata*. The material thrown out of the well also yielded *Cyprides*, *Paludina carinifera*, and *Unios*. We believe these clays to be of Upper Purbeck age, for the lower part of them, with a band of calcareous grit, exactly like that in the well, can be seen in the first cutting west of the station, and they are succeeded by a set of clays, marls, and thin limestones, which have a much greater resemblance to the Purbeck beds than to the Wealden.

When the railway was made there must have been an excellent section of these beds and the upper part of the Middle Purbecks in the two cuttings west of Dinton Station; now they are so over-

grown that it is very difficult to make out the relations of the strata, for they are certainly flexured and perhaps faulted. We feel sure, however, that the beds in the first cutting are higher than those in the second, and we hope in a future paper to publish the evidence on which we base our conclusions. If our reading is correct, there is a well-developed Upper Purbeck series in the Vale of Wardour, with a thickness of 70 or 80 feet; and this is succeeded by representatives of the Wealden and Vectian series, which, however, are poorly developed and taken together are less than 100 feet thick.

IV.—THE RECENT AND RAPID ELEVATION OF THE HIMALAYAS.

By HENRY H. HOWORTH, Esq., M.P., etc.

IN the last Number of the *GEOLOGICAL MAGAZINE* my friend Mr. W. T. Blanford takes exception in very courteous terms to the views I have maintained in regard to the recent elevation of the Highlands of Eastern Asia. I cannot, however, quite grasp how far he agrees or disagrees with me. He does not apparently question the evidence which has so impressed experienced observers like Humboldt, Murchison, Tschihatcheff, Cotta, and Senkofski in regard to the absence of traces of widespread glacial phenomena in the high mountains of the Ural, the Altai, and the Thian Shan ranges, and which apart from all considerations seems to me inexplicable on any other theory than that these mountains did not exist during the so-called Glacial Period.

Mr. Blanford limits his criticism to the Indian evidence; but even here I do not quite understand what is the exact position he maintains. In the *Manual of Indian Geology*, that splendid encyclopædia of facts on whose title-page his name occurs with that of Mr. Medlicott, it is stated over and over again that traces of glaciation are nowhere present in peninsular India. In the same "*Manual*" it is argued that the so-called glacial phenomena which have been said to occur in the Punjaub and other parts of the Plains are to be otherwise explained, and I believe I am right in attributing to Mr. Blanford the view that the old glaciers of the Himalayas never protruded into the plains.

This limits the problem therefore to the Himalayas themselves. Mr. Blanford objects to Mr. Campbell's very emphatic evidence because he had never penetrated into the inner valleys, and only spoke of the outskirts where the valleys open out. This is true; nor does Mr. Campbell claim to have done more than deduce his conclusions from what he saw. He was a very keen observer, he had seen glacial phenomena in all parts of the world, he went specially to study glacial phenomena on the spot, and his descriptions of what he saw, which are very minute and graphic, seem to me to be most conclusive that the lower parts of the Himalayan valleys show no traces of glaciation.

But I did not quote Mr. Campbell only. General McMahon, who has studied and written much on the Himalayas, and published his observations in the *Records of the Indian Geological Survey*, is just