

## CORRESPONDENCE.

## THE OUTLIER OF CARBONIFEROUS LIMESTONE NEAR CORWEN.

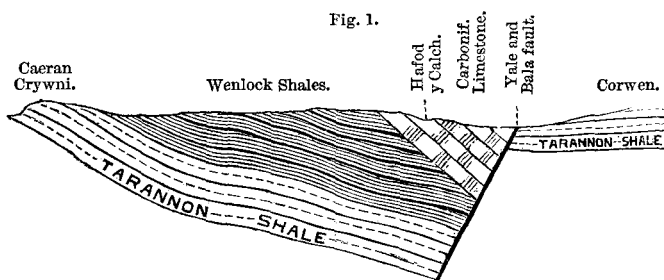
*To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—Pending the appearance of Professor Ramsay's Memoir on North Wales, in which the conclusions arrived at by the Geological Survey will doubtless be fully stated, will you allow me briefly to give some of the reasons for believing that the outlier of Carboniferous Limestone near Corwen formed originally part of that which now sweeps round North Wales from Llan-y-Mynech to the Great Orme's Head?

The country around Corwen was examined by Mr. Talbot Aveline and myself, who spent many pleasant but laborious months in it, so that not only was no rock-exposure unknown to us, but there was hardly a boulder with which one or other of us could not claim a personal acquaintance. If, therefore our conclusions are wrong (and I, for one, utterly abjure all pretension to infallibility), it is not that we spared our labour in examining the ground, and collecting data for arriving at them.

The patch of Carboniferous Limestone at Hafod y Calch is on the downthrow side of the great 'Yale and Bala' fault which cuts across Merionethshire and Denbighshire from SW. to NE. On examining the Survey section, sheet 39, it will be seen that the limestone dips to the NE., as mentioned by Mr. Davies,\* and also that it rests unconformably on the Wenlock Shale, from beneath which the Tarannon Shale rises out, about 2 miles to the SW. On the SE. side of the fault the Tarannon Shale is at the surface close to Corwen, with the Wenlock Shale (or Denbighshire Grits, which in all this region form the base of that shale) just over it.

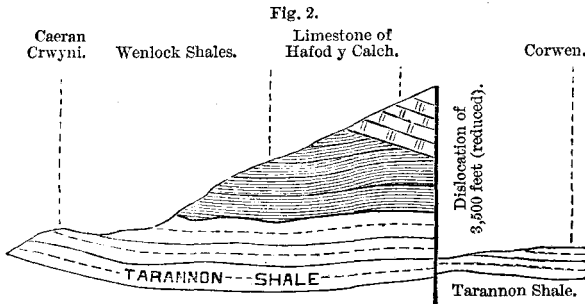
The rough diagrammatic section, fig. 1, will serve to give a general notion of the facts.



According to the section, there is a thickness of about 3,000 feet between the base of the limestone and the Tarannon Shale, which,

\* See GEOLOGICAL MAGAZINE, Vol. II., p. 233.

with 500 or more feet of Carboniferous rocks, will give a downthrow to the NW. of 3,000 or 4,000 feet to the fault there. Now, suppose we imagine this *dislocation* to be *reduced* (to borrow a term from the surgery) by the simple process of lifting up the Tarannon Shale on the downthrow side of the fault, and putting it on the same level as the corresponding beds on the Corwea side of the fault, as suggested in fig. 2.



We should then have a hill 3,000 or 4,000 feet in height capped by the Carboniferous Limestone; and anyone standing on that hill and looking to the east would see the limestone cliffs of the Eglwysegle rocks near Llangollen, with the ends of the beds facing right at him. Produce the beds about Llangollen with their mean rise of about  $5^{\circ}$  towards Corwen, and they would just be about 4,000 feet above the level of the country there.

It is therefore a by no means improbable supposition that the preservation of that little patch near Corwen is due to the joint action of the downthrow of the fault, and a local basin-shaped depression of the beds there. An undulation in the beds at that particular spot perhaps enabled the fault to bring down higher beds than it did just north of it.

The effect was, that the patch of limestone was there let down to such a low level into the earth, that the denuding forces which have ever since been at work have not yet destroyed it. It has been spared as if to prove to us that at the time when the great fault was produced, the limestone spread over the whole area.

Now when was that great fault produced? and when did the chief part of the destruction and removal of rock take place? The answer to these questions will entirely absolve us from the necessity of looking for the materials, and especially from searching for them in the Drift of the Glacial period.

Whenever the fault commenced, its production was finished before the time of the deposition of the New Red Sandstone. In like manner, although denudation has been taking place ever since the first elevation of the rocks above the sea, yet by far its greatest amount occurred before the deposition of the New Red Sandstone.

Let anyone walk from Corwen up the Nant Morwymon, through

the Hundred of Yale, along the course of the great fault, past the broken limestones north of Cynr y Brain and the division between the Denbighshire and Flintshire coal-fields to the plains of Cheshire : he will find the level beds of New Red Sandstone sweeping undisturbedly across the course of the fault, and resting in one place upon Permian beds, in another on Coal-measures, and in another on the Millstone Grit.

Let him walk into the pleasant Vale of Clwyd, and he will find the remains of the Carboniferous Limestone, which sweeps round the head of that valley in a beautifully symmetrical synclinal curve, covered in the centre of the valley by horizontal beds of New Red Sandstone. The Millstone Grit and the Coal-measures which once spread over that Carboniferous Limestone had been all swept away before the time when the New Red was deposited upon it.

What became of the materials would be a wild speculation even to guess at. Limestones would of course be redissolved and restored to the Ocean from which they were originally derived. They may have been resolidified and redissolved half a dozen times since then. The sandstones of the Millstone Grit may have entered into the composition of the New Red Sandstones. The Coal-measure clays may have been used up to form beds which have been destroyed and left no trace of their existence. Some of the materials may perhaps have ultimately entered into the composition of the Lias or other clays of the Oolites. *Quien sabe?* J. BEETE JUKES.

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*To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—In No. X. of your Magazine (p. 181) there appeared an abstract of a paper by Mr. Thomas Smyth, ‘On the Upheaval of the Shores of the Firth of Forth during the Human Period ; with a notice of the recent discovery of flint weapons at Marionville (between Edinburgh and Portobello).’

Mr. Smyth states that he found ‘Oyster-shells for a distance of a quarter of a mile from the shore, to a height of about 43 feet above the level of the sea . . . . . beneath a stratified deposit of sand and gravel;’ and that he ‘had traced the same stratum, *though devoid of shells* [the italics are mine], to a height of a hundred feet.’ Had Mr. Smyth looked into the writings of those who hold that, on the shores of the Forth, no evidence is apparent indicative of a recent rise, he perhaps would be convinced that the oyster-beds are storm-raised, and the sands above them not marine, but blown sand. Mr. Smyth goes on to say, ‘I then, in the second place, mention the known upheaval of at least 25 feet since the time of the Roman occupation.’ If Mr. Smyth, or any of your readers, will peruse a paper which I read before the Royal Society of Edinburgh on the 21st April, 1862, and published in the 16th volume of the ‘Edinburgh New Philosophical Journal,’ entitled ‘On the Danger of Hasty Generalizations in Geology,’ he will find that I have proved Mr. Geikie’s views fallacious on this point, as that gentleman has not yet disproved my arguments. Further, if Mr. Smyth will honour me with a

perusal of this paper, he will find that his arguments from the Ordnance Survey are there anticipated, but have led me to a different conclusion. With regard to his finding flint weapons at Marionville, this has no bearing on the question; as all it proves is that the aborigines formed their rude weapons after the sand was deposited by winds or river-action, but most certainly never by a *marine agent*, because utterly 'devoid of shells.'

Mr. Smyth adds, 'Additional evidence, which I intend soon to lay before our Society, fully corroborates the facts I have adduced regarding the present rate of upheaval, and shows beyond a doubt that the whole southern shore of the Firth of Forth between Queensferry and North Berwick, a distance of twenty-eight miles, and that portion of the east coast which lies between North Berwick and St. Abb's Head, about twenty-four miles additional, have been upheaved more than two and a half feet within the last fifty years.'

From the Temple of Jupiter Serapis, at Puzzuoli, I extracted upwards of twenty shells of dead *Lithodomi*, whose burrows perforate the marble columns from the height of about 12 feet above their pedestals to at least 23 feet above high-water mark.\*

Now, Mr. Editor, if Mr. Smyth, or Mr. Charles Maclaren, or Mr. Robert Chambers, or Mr. Geikie, or Sir Charles Lyell, or any other advocate of the theory that the shores of the Forth have risen since the human epoch, can show me the bore of a *Pholas*, with a dead shell in it, one foot above the present limit of *Pholas*-life so abundant on our shores, I will yield the whole argument to them. I have looked in vain for such evidence all along the shores of the Forth and Clyde, but have failed to find one; and I leave those gentlemen to prove that the *Pholadidæ* were imported by the Romans. Until this proof is produced, all the other arguments are futile.

I am, &c.,

ALEXANDER BRYSON.

HAWKHILL, EDINBURGH.

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*To the Editor of the GEOLOGICAL MAGAZINE.*

SIR,—May I ask the favour of the insertion of the following correction; or, rather, I should say, the following illustration of the familiar quotation, 'Ne sutor ultra crepidam'?

In the 'Geologist,' July 1860, the Editor obliged me by publishing this note:—

'CHEMICAL EVIDENCE OF THE SPONGEOUS NATURE OF FLINT FOSSILS.—If a flint coated with chalk be immersed in hydrochloric acid, the chalk will be dissolved and the flint will remain unaffected. In many instances, however, there is a point beyond which the acid, even if renewed, will not act, and a white coating is left which neither nitric, sulphuric, nor hydrochloric acid will touch. This incrustation I have found to consist of sulphate of lime. It is met with on those flints which contain fossils, such as sponges, &c. I have several specimens of laminated flint presenting this peculiarity.

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\* See 'Lyell's Principles of Geology' (7th edition), chap. xxx. p. 486 *et infra*.

I have also a fossil Echinus from which the chalk has been entirely removed by acid, and on which the sulphate remains beautifully arranged only around the lines of orifices between the plates.

‘May I presume to draw the inference that the above facts lend confirmation to Dr. Bowerbank’s views on the spongy basis of many flints? May they not also be adduced in support of the opinion that holds the animal nature of sponges? We know that animal substances are partly albuminous, and that sulphur is one of the elements of albumen. The animal substance, in undergoing decomposition, during or previous to fossilization, would part with its sulphur, which would be seized by the lime of the chalk in immediate contact with it, and hence the coating of sulphate of lime, for which I was totally unable to account, until Dr. Bowerbank was kind enough to impart to me some of the vast information he has amassed on the nature and habits of sponges, recent and fossil.’

I feel it to be due to your readers to state, that I have since found that there was a great mistake in my experiments, and that the insoluble substance left on the flint after the solution of the chalk by hydrochloric acid was not a sulphate of lime, but simply a modification of silica (the base of flints). With the supposed fact fall, of course, the inferences which seemed to lend support to views that doubtless stand in small need to be propped up by error. Had I been more thorough in experimental chemistry, I should not have made this blunder; had I been wiser, I should not have ventured ‘beyond my *last*.’—I remain, &c. W. B. KESTEVAN, F.R.C.S.

UPPER HOLLOWAY, LONDON.

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#### MISCELLANEOUS.

ALLEGED GOLD-FIELD AT THE HEAD OF THE NEPEAN RIVER, NEW SOUTH WALES. By the Rev. W. B. CLARKE, F.G.S., &c. (Extracted from a Letter to the Editor of the *Sydney Herald*.)—The eastern boundary of the plateau in which the Macquarie and the Nepean rise is the escarpment which backs the Illawarra, where it is about 2,000 feet above the sea, and the Nepean waters falling westerly from the edge collect in a channel which runs to the northward, other branches falling from the northern slope of the Mittagong more to the westward, towards the road to Bong Bong, and not far from where it leaves the Berrima road at Little Forest.

The Cordeaux River collects in numerous heads along the edge of the escarpment farther to the north, and the back of Mount Kembla, and finally it joins the Nepean at the Pheasant’s Nest. At one spot Nepean waters collect behind a ridge, not more than fifteen chains distant from the swamps of the Cordeaux. Intermediately, a Nepean water rises near Geringulli Mountain, where the elevation is about 1,800 feet above the sea, and runs at first northerly, and then turns to the west to join the main stream. The whole extent of the coast-