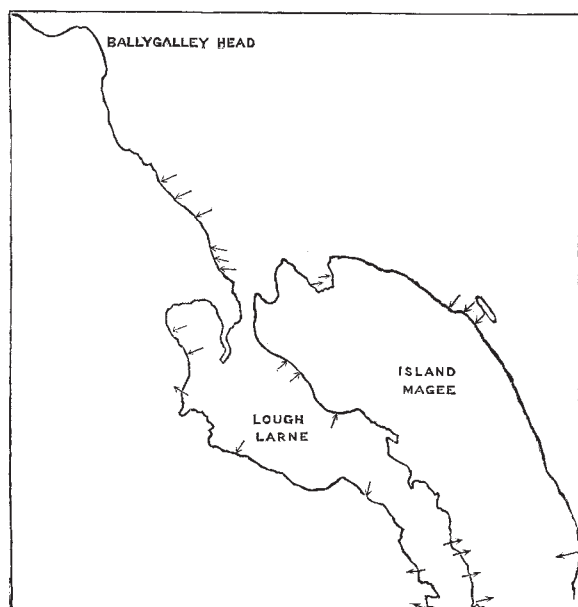


causes of movements of the earth's crust; for if the fluid or viscous layer is chiefly due to internal heat and the relaxation of pressure near the surface, it may exist much nearer to our feet than could otherwise be admitted.

One of the gravest difficulties that the theory that added weight produces subsidence by acting on a fluid layer has had to contend with has been the great depth at which this fluid layer has had to be placed. It has always seemed to me next to impossible that liquid lava could well up from any such depths as those assigned to the viscous layer, or that a solid crust of so great a thickness should be sensitive to, as it is now shown to be, and rise and fall under, barometric changes. In acknowledging Mr. Fisher's letter and thanking him, I feel I am ungrateful in questioning that part of his work which interposes barriers which would break up the continuity of the viscous layer; I allude to his theory of "the roots of mountains." There does seem to me to be little fact in support of so startling a proposition, and I think the existence of volcanic vents, scattered through and in the midst of some of the highest chains, renders its acceptance difficult.

Mr. Murray restates his theory of the formation of coral atolls and reefs in the clearest manner, but I do not see that he explains any fact left unexplained by Darwin, or exposes any flaw in Darwin's reasoning. These masses of coral may have been continuously forming throughout even successive geological



Sheet 21. Geological Survey of Ireland, Antrim Coast, facing north-east.

periods, and their thickness is perhaps not exceptionally remarkable relative to that of slowly deposited oceanic sediments. There is no evidence that atolls are mere incrustations of volcanic craters, and it seems to me difficult to imagine so great a number of craters at the same level so completely masked. There are volcanic isles in abundance outside coral areas, but none I think, or few, of the form of a coral atoll. After all, Mr. Murray only shows that a second explanation is possible, though I still prefer the first.

I regret, being from home, that I am unable to answer Mr. Stanley. I may have alluded to the sinking of Greenland myself, and if I did not it was because the illustration was too familiar and self-evident. The sinking on the Greenland coast is not, I have understood, universal.

I still think it would render a service to science if readers of NATURE residing on sea-coasts would furnish authentic examples of elevation or subsidence or of waste. The magnificent Antrim coast, which I have recently visited, furnishes examples of subsidence among most unyielding rocks. The cliffs on the mainland are capped with basalt and dip inland, yet the basalt reappears in the Skerries out to sea with the same dip and at a much lower level. The same correspondence in stratification is seen between the mainland and Rathlin, but also with a great difference in elevation. The dip inland in all cases on this coast

should bring up much older rocks out to sea, unless we are prepared to admit a fault running parallel to the coast, and following its sinuosities, and at right angles to the general lines of faulting.

The way in which all the strata forming the cliffs along the Antrim coast dip inland is very remarkable. The accompanying tracing from the Geological Survey Map is of a particularly indented coast-line, and the arrows show that the dip is everywhere away from the sea, irrespective of any general strike. In fact the general strike must often be the reverse of that shown on the coast for the same strata crop out at much higher levels on the hills farther inland. I recollect that most cliffs that I have examined, particularly in Hampshire, dip away from the sea. It would appear that the removal of weight along a cliff line causes a local elevation, which gives a cant inward, whilst subsidence takes place under sediment farther out to sea. This seems to explain the observed facts connected with marine denudation; but I must take a future opportunity of entering more thoroughly into this part of the question.

Glasgow, September 12

J. STARKIE GARDNER

"Zoology at the Fisheries Exhibition"

LETTERS have been published in NATURE of August 9 and 16 (pp. 334 and 366) by Mr. Bryce-Wright of Regent Street and Prof. Honeyman of Canada, calling in question the accuracy of statements made in an article in NATURE (vol. xxviii. p. 289) which were condemnatory of exhibits for which these two gentlemen are respectively responsible. It is natural that they should seek to remove the unfavourable impression which the statements in question were intended to convey: they seem, however, to have been unacquainted with the complete character of the information upon which the statements were based. Mr. Bryce-Wright states that it is not the fact that some of the corals exhibited in Lady Brassey's case belong to him. Nevertheless it is the fact that when the jury of Class V. asked Mr. Bryce-Wright to point out the corals entered in the official catalogue under his name, No. "8136," he informed them that the corals so entered were in the same case with Lady Brassey's corals, and formed part of that collection. It is also the fact that in the opinion of experts the names attached by Mr. Bryce-Wright to many of these corals are incorrect; and as to his assertion that these specimens have been compared with those in the British Museum and with those obtained during the Challenger Expedition, it is a fact that neither the one series nor the other has been accessible for such purposes for some considerable time, and I have reason to believe that no qualified zoologist has made a comparison of the corals exhibited by Lady Brassey and Mr. Bryce-Wright with any collection at all.

The letter of Prof. Honeyman in reference to the naming and state of preservation of the Collection in the Canadian Department, for which he is responsible, is misleading. The discreditable state of that collection, to which a passing allusion only was made in NATURE, has been remedied in one or two instances since the visit of the jury of Class V. Should there be any doubt as to the justice of the opinion expressed in the article in NATURE, I would simply ask Prof. Honeyman whether he would have any objection to allowing the matter to be decided by reference to the report of the jury of Class V., of which he was a member. I should be surprised (and so I think would he) were the report of that jury, when published, found to be at variance with the opinion expressed in the article in NATURE. Prof. Honeyman's statement that the specimen of *Cryptochiton Stelleri* is properly exhibited in a convenient glass jar and labelled inside and out, is calculated to mislead. When first exhibited it was not labelled with any name; subsequently it was labelled with the name of a genus of Holothurians, "Psolus." After the visit of the jury of Class V., probably as the result of information imparted by some of the eminent zoologists who served on that jury, it was labelled with its proper name. Without citing details, I shall simply state that there are (or were when the article in NATURE was written) far more serious blunders in the identification of specimens and worse instances of bad preservation in the Canadian collection of Invertebrata than those to which special allusion has been made.

THE WRITER OF THE ARTICLE

A Complete Solar Rainbow

MR. D. MORRIS, in his account of this rainbow (p. 436) appears to have fallen into a mistake in stating that its inner dia-

meter—taken by Capt. Winchester, R.N.R.—was $43^{\circ} 08'$. It should be, I think, “inner semidiameter.” The first circumsolar bow has a semidiameter of $41^{\circ} 37'$. That is almost necessarily invisible. The second circumsolar bow has a semidiameter of $43^{\circ} 52'$, and is rarely visible. I have no doubt that was the bow witnessed on board the *Norham Castle* on August 16

Athenæum Club, September 7

C. M. INGLEBY

Flint Flakes Replaced

As this subject has been more than once adverted to in *NATURE*, the following recent instances of placing flint flakes on to their original position may be interesting:—

Whilst examining the relics from Cowper's Camp, Epping Forest, in Mr. Raphael Meldola's house last month, I looked over a small number of flakes collected from one spot in the

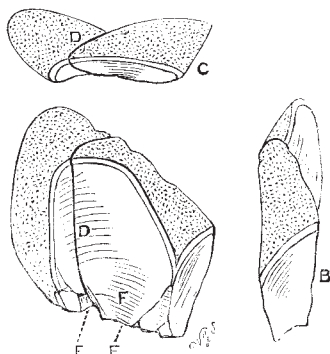


FIG. 1.

rampart of the camp, with remains of burnt wood and late Celtic pottery. I immediately saw that several of the flakes had been struck from the same block of flint, and after a short examination I managed to replace two as illustrated, one-half real size, in Fig. 1. The front of the two conjoined flakes is shown in the left-hand bottom figure, the side at B, the top at C, and the line of junction at D D. Behind E E are two cones of percussion, one belonging to each flake, and at F is the depression into which the cone of the missing frontal flake at one time fitted. The fractured part of the flint is deep chocolate brown, and lustrous, and the bark of the flint is dull ochreous; the flakes are undoubtedly artificial, and as old as the rampart of the camp, not less than two thousand years. This example, with other relics, will be placed in the Guildhall Museum.

Greater interest attaches to the replacing of Palæolithic flakes, as these are enormously older than Neolithic, and the chances are so very much against lighting on a perfectly undisturbed Palæolithic position.

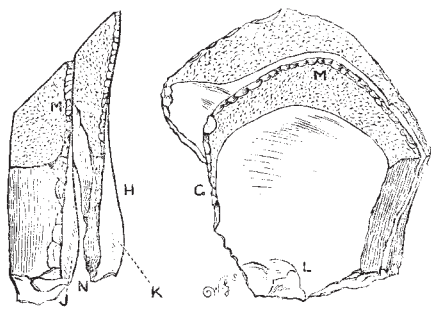


FIG. 2.

At Fig. 2 is illustrated (one-half actual size) two Palæolithic flakes from the “Palæolithic floor” at Stoke Newington Common, found and replaced by me. The front of the conjoined flakes is shown at G and the side at H. I found the lower flake two days before, and some distance from where I found the upper one; but as I have a method of placing newly found sharp flakes on a table, arranged temporarily in accordance with their colour and markings, I speedily saw that the upper flake would fit on to the lower one. Each flake has a cone of percussion, as shown at J K, and the upper flake has a well-marked

depression at L, corresponding with the missing flake, which, if it had been found, would have fitted on to the front of the two conjoined examples. Both flakes are sharp and slightly stained with the ochreous river sand which overlaid them. Both (especially the upper one) show unmistakable signs of having been used as scrapers, the upper curved edge (and that edge only) being worn away by use. The worn upper edge of the superimposed flake at M M is distinctly shown in the illustration. A small intermediate piece belonging to the position at N I did not find. Both are naturally mottled in a peculiar manner, and the pattern and colour of the mottling exactly agree.

WORTHINGTON G. SMITH

NOTES ON THE POST-GLACIAL GEOLOGY OF THE COUNTRY AROUND SOUTHPORT

SINCE the writer carried out the geological survey of the western coast of Lancashire in 1868 he has constantly been asked, “Is there any geology to be studied at Southport? Is not the country a sandy expanse fringing peat-mosses of ceaseless monotony?” The meeting of the British Association this week at Southport renders this a fitting time to reply to these questions; for, strange as it may appear, in these apparently unpromising surroundings exists a record of the complete sequence of events from the commencement of the Glacial episode down to the present time. The sand dunes, rising to 50 and even 80 feet in height, that form so prominent a feature between Liverpool and Southport, rest upon a wedge-shaped mass of sand blown from the coast by westerly winds over the thick peat-mosses that intervene between the coast and the rising ground about Ormskirk; the surface of the Glacial beds, with the overlying deposits, dip steadily towards the sea, and fragments of peat are frequently trawled up by the fishermen.

Beneath the sand dunes on the sea coast the peat is seen cropping out, and at the base of the peat occur the roots of forest trees embedded in clay beneath, while trunks of trees lie scattered in many directions, but generally with their heads lying to the north-east, as if they had been blown over by a gale from the south-west. The bases of the trunks are left standing in the places where they grew; all appear to have been broken off at a uniform level, and it is most probable that through the drainage being obstructed water surrounded the trees, which gradually became rotten at the point of contact of the air and the water, and thus the way was prepared for the effects of storms and hurricanes. Sections of these beds near High Town, at the mouth of the Alt, will be found of great interest. Sections also occur on the coast at Dunkirk, near Crossens. At the Palace Hotel, Kirkdale, a boring was put down in 1867, that proved the sand to be 78 feet in thickness, resting on 18 inches of peat, which occurs at about 90 feet beneath high-water mark. When the land stood this amount above its present level, the coast would range in a straight north and south line from St. Bees Head to the mouth of the Clywd at Rhyl, but there is no reason to suppose that this amount represents the subsequent submergence since the era of the peat in Lancashire and North Wales. It is far more probable that when the trees flourished, found at the bottom of the peat fringing these coasts, this coast nearly coincided with the present twenty-fathom line, which passes from Anglesea round the Isle of Man; in that island the same sequence of post-glacial deposits is found, and the Irish elk alike occurs in the grey slags beneath peat.

At the mouth of the Ribble very interesting sections occur at Freckleton and Dow Brook; the latter is crossed by a Roman road, and has upon it a “Roman bath,” only ten feet above the present high-water mark, proving the elevation of this coast has not been great since Roman times. The same fact is brought out by the interesting find of Roman coins near Rossall land-mark, near Fleetwood, which were found in a salt-marsh clay lying on the peat beds, at about eight feet below the