

bands of this drift, with intervening beds of sand, drift, or felspathic clay, the lower one, which is always on the bed rock, containing very large unwieldy boulders. Gold was found in some half dozen of the tributaries flowing into the Ullie from the north. Mining operations, however, had been confined chiefly to the Kildonan, the Suisgill, and the Torrish,—the two former being the more favourite grounds. Respecting the origin of the gold, he referred to the latest propounded theories on the subject. Sir Roderick Murchison takes us to the grand central plateau of Sutherland, whilst Mr. Campbell of Islay, who has written a pamphlet on the subject, hesitates whether to travel a little farther and carry us to Lapland and the Polar regions. Sir Roderick attributes the gold to the abrasion of the granites and metamorphic Lower Silurian rocks, in the interior, which have been carried by glacial action down the eastern slopes of Sutherland, and deposited in straths and valleys, such as those of the Ullie and its burns, the Kildonan, Suisgill, Torrish, etc.; whilst Mr. Campbell points to the fact of gold being found in Unst in Shetland, and in river drifts in Scandinavia and Lapland,—and, referring to data collected by himself and others respecting the curves of the glacial flow, suggests the possibility of the gold being brought by icebergs and glaciers from these Boreal regions. The Rev. Mr. Joass is inclined to infer that the granite may yet be found to be the matrix of the gold, and remarks that the material in which granular gold occurs, namely, the detritus, is not necessarily far travelled, for it includes boulders of apparently local origin. Mr. Cameron, whilst admitting all conclusions as yet to be more or less conjectural, is inclined to agree with Mr. Joass in ascribing the gold to a local origin, and probably to a granite matrix. With respect to the question as to whether the Sutherland gold fields would pay to work, Mr. Cameron says, upon the whole, whilst doubting the desirability of these fields for individual labour, he was disposed to believe that, with united enterprise and combined labour and capital, and with systematic and economical working, which would be vastly aided by the great natural advantages of the country, satisfactory results would be obtained.

CORRESPONDENCE.

NOTES FROM CORRESPONDENTS.¹

NOTES ON THE FLEET AND CHESIL BANK.—MR. EDWARD WILSON sends us a long letter, in which he discusses, among other topics, the origin of the present outline of the coast of the Fleet. Maintaining that at one time, before the Chesil Bank was formed, the land from Abbotsbury to Portland was shaped into cliffs like the coast now west of Abbotsbury, he is inclined to regard its present shape as due to a peculiar kind of denudation, such as might be per-

¹ In consequence of the small space at our disposal, we are compelled to make abstracts of a number of letters; but our correspondents will, we feel sure, not complain of this, as we have given them good notice (see the Prefatory remarks to Vols. V. and VI).—EDIT.

formed if a number of small streams, instead of flowing into a large river, were suddenly absorbed by, comparatively speaking, an enormously broad and consequently almost stagnant dyke of freshwater, lying at right angles to their course, which of itself was capable of little or no denuding force.

In regard to the heaping up of the shingle which forms the Chesil Bank, Messrs. Bristow and Whitaker assume a west to east current, moving the shingle in the same direction; but, if so, why are the pebbles larger at the easterly end of the Fleet, and why do they gradually diminish in size, and terminate in sand to the west? To Mr. Wilson these phenomena appear explicable only on the assumption of a former current from east to west, even if the present currents be in the reverse direction.

FOSSILS IN THE BUDLEIGH-SALTERTON PEBBLES.—MR. E. B. TAWNEY, F.G.S., writes to explain some misapprehension in regard to his reported discovery of Budleigh-Salterton fossils *in situ* at Anstey's Cove. Last summer he found on the coast, at Smugglers' (not Anstey's) Cove, red and pale-reddish grits, containing casts of the same fossils as occur in the red beds of the Hangman Grits of North Devon, namely, casts of a large *Myalina*, and other bivalves with deep concentric lines of growth, numerous Univalves (*Natica*?), *Tentaculites*, and *Stringocephalus Burtini* (with casts of the hinge). Although not in such good condition as the Hangman Grit cast, they are apparently the same. In this opinion he is confirmed by Mr. Etheridge, who has identified the large *Myalina* and other bivalves of the Hangman in some of the pebbles from Budleigh-Salterton.

EXPLORATION OF THE LEAF-BEDS IN THE LOWER BAGSHOT SERIES OF HANTS AND DORSET.—THE REV. P. B. BRODIE, F.G.S., &c., suggests that while the search for leaves is being carried on in this deposit, the explorers should be on the look out for any fossil Insects that may occur associated with them, or in the fine marls alternating with the leaf-beds. Very few remains of this tribe have as yet been recorded from our older Tertiaries. In his collection he has some insect remains from the Bagshot series of Dorset; they consist chiefly of small elytra of *Buprestidæ*, *Curculionidæ*, and a single elytron of one of the *Holopidæ*. Some rather indistinct forms were also exhibited by Mr. G. Maw at the late meeting of the British Association at Exeter. Mr. Brodie hopes that some of the members of the Naturalists' Club, recently established at Bournemouth, may be induced to examine these beds for Insects. The apparent scarcity of their remains in the Tertiaries generally is probably due to the want of a more minute investigation of the beds than has hitherto been given to them.

THE STONE-BORING CONTROVERSY.—In reference to Mr. Rofe's article in the January number of the GEOLOGICAL MAGAZINE, MR. D. MACKINTOSH writes to state, on the authority of Mr. Gosse (*Good Words* for 1864), and Mrs. Merrifield ("Natural History of Brighton"), and from what he has himself seen near Exmouth, that the *Pholas*

bores at low water, and that its holes run *at various angles* to the horizon, one hole very often cutting through another at nearly right angles. The holes in inland or supra-marine limestone districts are frequently bored through each other. Mr. Mackintosh is of opinion that the *Pholas* can bore upwards; it is certain that the *Saxicava* can do so.

In different parts of England and Wales Mr. Mackintosh has observed great numbers of borings in limestone rocks, at various altitudes above the sea-level. They seldom ran vertically upwards from the underside of a stone *in situ*, but were not infrequently horizontal, and sometimes directed at a small angle downwards. In no instance has he found a live snail in any of these holes. All his observations tend to militate more or less against the theory that the holes have been excavated by snails.

DENUDATION OF THE LAKE DISTRICTS.—MR. MACKINTOSH offers a few remarks respecting Mr. J. C. Ward's article in the January number of the GEOLOGICAL MAGAZINE (p. 14). The assumed probability that the sea, during the Glacial submergence, was an immovable frozen mass (an indispensable prop, as he considers, to the subaërial theory), is opposed by four facts:—1. The proximity of the Lake District to the southern border of the ice-covered region; 2. The diminution of cold consequent on the diminished extent of high land, when the area of Great Britain was reduced to the condition of small islands; 3. The intensity of marine action, proved by the enormous accumulations of drift in areas contiguous to the Lake District; 4. The transportation of boulders from one part of the Lake District to another, and from that district to surrounding areas, proving the activity of oceanic currents.

Mr. Mackintosh objects to the existence of fallen débris (or screes) on steep slopes being brought forward as a proof of sub-aërial origin of valleys. The valleys existed before the débris began to fall, and now they are in course of being obliterated.

The carrying powers of the streams in the Lake District is in most places truly insignificant when compared with the rate of accumulation of screes.

Mr. Ward disputes his assertion that the escarpments generally face the east, south-east, or north-east. Mr. Mackintosh remarks that the term escarpment ought not to be confined to the outcrop or upcrop side of a ridge, because this side is not always marked by the most regular, steep, and continuous slope. He would like to be informed of the existence of a long, steep, continuous slope, with or without cliffs, facing the north-west, west, or south-west, to the east of a line drawn from Blackcombe to Skiddaw Forest, with the exception of the Wallow Crag escarpment (which nearly coincides with a fault), and Loanthwaite Crag. The greater part of the Lake District lies to the east of this line. Two or three exceptional cases might be found, but Mr. Mackintosh has not met with any.

To the west of this line, as he has elsewhere remarked, the principal escarpments face various points of the compass.

PALOPLOTHERIUM ANNECTENS, OWEN.

SIR,—The specimens described, June, 1847, as of *Paloplotherium annectens*, being of an immature individual with the last lower molar, *en germe*, in its formative alveolus (Quart. Journ. Geol. Soc. Vol. iv. pl. 3, fig. 4) the hind lobule was not calcified. Subsequently receiving from Hordwell the mandible of an adult, I had it placed by the side of the first specimen, and labelled with its name in the British Museum. The rapid accumulation of materials has delayed the Second Edition of my “British Fossil Mammals;” but the rectification of the characters of *Paloplotherium* was made by PICTET in the Second Edition of his excellent “Traité de Paléontologie,” vol. i. p. 312 (“la dernière a trois lobes.”)

RICHARD OWEN.

THE LIQUEFACTION OF ROCKS AND “VOLCANOS.”

SIR,—My error against Dr. Sterry Hunt and Mr. Scrope, conjointly, was committed in the pages of *Scientific Opinion*, and I acknowledged it in the same publication as soon as Dr. Hunt had shown me that I was wrong. I suppose that I did not read Dr. Hunt's paper, when it appeared in the Magazine in June last.

But I submit that that has not disposed of my letter to you, written a year ago.¹ For in the sentence which he quotes from “Volcanos,” p. 266, it is evident that the author is referring to changes in the condition and mass of the volcano itself; because he immediately instances the sealing up of a fissure by cooled lava, and the accumulation of ejected matter. Changes of pressure, arising from movements in the earth's crust, through the cooling of its general mass, are not suggested.

I am bound to thank Dr. Hunt for his favourable mention of my paper as a whole.

O. FISHER.

P.S.—*Erratum*, at p. 59, line 21, for “fused,” read “glassy.”

MISCELLANEOUS.

Professor OWEN has recently received, with remains of *Diprotodon*, etc., from the lacustrine deposits, Darling Downs, Australia, portions of a Crocodile, in similar fossil condition, which he determines to be identical with the species of Crocodile still existing in the Queensland rivers.

ILLUSTRATIVE GEOLOGY AND PALÆONTOLOGY.—A very effective chart of British Geology, suggested by Mr. Henry Cole, C.B., for the Technical Education System, has been recently carried out by Mr. James R. Gregory, geologist, of Russell Street, Covent Garden, and is placed in the South Kensington Museum. It is chiefly compiled from, and intended to illustrate, Professor Morris's Geological Chart. The names of the formations, the uses to which the rocks are applied in the arts, and the localities where they are best exhibited, are duly enumerated on cardboard, to which are attached, in parallel lines, various fossils and a few rocks,

¹ GEOL. MAG., Vol. vi., p. 45.