

3. The beds of sand interstratified with beds of clay.
 - (a) Their number, thickness, and extent, and the directions in which they vary in thickness.
 - (b) Presence of pebbles and grains of quartz. Their size; rounded or angular; free or cemented together.
4. The occurrence of "re-formed" beds containing fragments of clay enclosing leaves. Whether these beds are confined to mouths of chimes.
5. Varying thickness of the pebble bed and gravel beds on the surface.
6. Shells and insects have as yet been found only at Studland. A further collection, with note of exact locality, would be very valuable.

It is requested that letters be directed to W. Stephen Mitchell, Esq., Caius College, Cambridge, and specimens (which should be separately wrapped in soft paper and firmly packed in hay or crumpled paper) to Henry Woodward, Esq., British Museum, W.C.

It is hoped that arrangements will soon be completed in Bournemouth for a public local collection.

CORRESPONDENCE.

MEGACEROS HIBERNICUS, THE GIGANTIC IRISH DEER.

SIR.—It may interest some of your readers to learn that I have a very fine pair of horns, with skull attached, of the gigantic Irish deer (*Megaceros Hibernicus*), found in the bog of Schiule, Co. Limerick, at the depth of about 16 feet. The measurement of the horns is as follows:—Tip to tip, 12 feet 8 inches; round the curve, 14 feet 5 inches; breadth of palm,¹ 4 feet 6 inches (?). Should any museum require a fine head of this deer, I shall be glad to send further particulars.

ROBERT COX.

BALLYNALE, BALLINGARRY, Co. LIMERICK.

SIR,—Please publish the following:—William Hinchley, Carpenter, Thomond's Gate, Limerick, has a good specimen of a head of a female *Megaceros* to sell. These are rather rare and hard to get, as they are so like horses' heads that few people who find them put any value upon them.

G. H. K.

CONNEMARA.

ON THE FORMATION OF THE CHESIL BANK.

SIR,—In a paper under this heading in your number for October, Mr. Bristow and Mr. Whitaker quote from my book "Rain and Rivers." I have said that Portland was probably at one time made an island by the erosion of the sea, and that it was afterwards re-joined to England by the rising of the land. Mr. Whitaker tells

¹ ? Circumference.—EDIT.

us of a raised beach on Portland "thirty or forty feet above the sea." Is not this proof positive of the correctness of my theory? Did Portland rise thirty or forty feet and the isthmus remain stationary? This junction with the land made Portland a groin protruding at right angles with the line of coast; and I have headed a passage (page 119 "Rain and Rivers") "Portland is a *natural groin* which catches the Chesil beach." I have also said that to any one conversant with the laws of the groin the mysteries of the Chesil beach vanish. Mr. Whitaker adopts the term "natural groyne" as his own. He also adopts the theory as his own, and says of it "that of course all must agree" to it. I have never happened to see Portland called a "natural groin;" nor have I seen the phenomena of the Chesil beach explained as those of a beach collected and formed by a groin. If Mr. Whitaker has, perhaps he will tell us where and by whom this has been published. Be this as it may, I would wish to say a word as to the heaping of the beach which is formed by the "natural groin." Mr. Whitaker avoids the question; but he mentions "the set of the current" from west to east three times. The shingle he thinks is carried by this current, since, page 435, the shingle is "stopped in its easterly course," and in page 436 he seems to form the shingle beach by "the general set of the current." Lyell, as quoted by Mr. Whitaker, attributes the heaping to "meeting of tides," "a great eddy," "the tidal wave," and "the set of the tide in the narrow channel." While Herschel (*Physical Geography*, second edition, page 91) makes "tide currents" deposit "the great shingle drift of Dungeness Point and the Chesil Bank."

Let us, for argument, grant Mr. Whitaker's *assumed* current from west to east along our south coast, and let this current be of force sufficient to drive pebbles of the size of those at the Portland end of the Chesil beach, they would at least travel along the bottom of the current. But even if they floated on the top of the current how could they get to the top of the beach which is forty-two feet above the level of the water? So if Lyell's and Herschel's tide had "edded" here, it must have flowed as high as the top of the beach, and even then it must have carried the pebbles on its surface to have placed them where they are. These philosophers would be the first to remind us of the rule that water can only find one level, and that it cannot rise above its source; and this rule entirely precludes the possibility of the beach being heaped by tides or currents. But rules are apt to have exceptions, and the exception here is that when impact is given to water it will rise itself, and it will raise other substances very much higher than its source. In art we see this in the ram which sends water to the top of the house, though the ram and the source of the water may be much lower than the foundation of the house. In nature we see the exception in the effects of the impact given to the wave by the wind. It is then not tides or currents of water, but currents of air giving impact to the waves which have driven the drift to the top of the beach. Drayton gives this *vera causa* in 1613, "by the south wind raysd." One great law of the sea-shore is, as the wind blows the wave flows, and as

the wave flows the beach goes. It is the prevalence of south-west winds in the northern hemisphere which runs beaches across the mouths of so many of our south-coast streams, great and small; and it is a law on the south-coast (quoted in a note by Mr. Whitaker himself) that where a travelling beach comes across an estuary the water escapes by soaking through the beach (the frequent cause of the so-called submerged forest) or by forcing a passage to the east. Notwithstanding this law Mr. Whitaker starts his theory of the escape of the Fleet-water eastward as new, and he considers the shingle of the Chesil beach to be in an "anomalous position," his reason for calling it "anomalous" being that the beach is longer than other beaches, and that on the land side "there is no river emptying into the sea, but only a succession of very small streams." But is not a succession of small streams, flowing by one channel into the sea, "a river emptying into the sea?" If Smallmouth sands were raised to the height of the Chesil beach, both being impervious, the Fleet would be a freshwater lake at that height. It would, however, quickly cut an outlet, and form an estuary at the present depth, and the land side of the estuary would of course be denuded as now by rain and rivers like the sides of every other estuary.

I must not ask for your valuable space to enter farther into the laws of the sea-shore, to describe the cause of the so-called "submerged forest," the principles of that most ingenious device the groin, or to explain the cause of the sorting and sizing of the materials of the Chesil beach. These materials decrease most gradually for twenty miles, that is, from the large pebbles at Portland to the pure blown sand at Bridport. These things are detailed in the eighth chapter of "Rain and Rivers," which is headed "Travelling of Sea-beach," a subject on which profound ignorance prevails.

GEORGE GREENWOOD, Colonel.

BROOKWOOD PARK, ALRESFORD,
4th of October, 1869.

DISCOVERY OF ARCTIC SHELLS BELOW BOULDER-CLAY, AT WOODHILL, KILMAURS.

SIR,—In making some observations on the Boulder-clay, in the Kilmarnock district, in the end of Autumn, 1868, I was fortunate in finding a few Arctic shells from a bed of sand lying below the Boulder-clay at Woodhill, Kilmaurs. The shells are now in the Hunterian Museum, Glasgow, and, as recognized by Mr. John Young, the Curator, are *Leda oblonga*, *Tellina calcarea*, *Pecten Islandica*, *Cyprina Islandica*, *Astarte sulcata*, *A. compressa*, *Natica Granlandica*, and fragments of a large species of *Natica*, and a *Littorina*. They were got in sinking a pit scarcely half-a-mile from the old quarry, where so many elephants' tusks and deer horns were found. The section stands thus—Boulder-clay, fifty-one feet; sand, with marine shells (the above), one foot three inches; peaty clay, mixed with sand, one foot six inches (this is the bed in which the tusks and horns were found); run, or cemented, gravelly sand, one district, and went to considerable expense in getting them properly