

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

foot six inches, lying upon the Carboniferous strata. Farther researches this summer have fully confirmed my first impression, that the shell-bed lies below the lower Boulder-clay. The country around Kilmarnock is largely perforated with pits, and good opportunity is afforded for observing the surface-beds. In none of these pits has Boulder-clay been found underlying the sand and peaty beds. The sand bed is very irregularly developed, being as thick as thirty feet in one pit, and in others ten feet, twenty feet, and so on. The peaty bed is apparently the remains of an older bed, most likely of estuarine (?) formation, being found in patches, often at considerable distances apart, remnants no doubt of a larger bed that has suffered by denudation. The discovery of these shells throws light upon the former discoveries at Kilmarnock, and gives the true horizon of the bed where the elephants' tusks and horns of the reindeer were found.

R. CRAIG.

LANGSIDE BEITH,
October 7th, 1869.

SIR,—Will you kindly give publicity to a work which is now in progress, viz. Murray's Handbook to the Geology of England and Wales; and allow me to appeal, through the medium of the GEOLOGICAL MAGAZINE, to all brothers of the hammer for assistance and contributions, particularly in local geology, which will be most gratefully acknowledged.

PHILLIPS BEVAN, F.G.S., Editor.

4, SUFFOLK SQUARE, CHELTENHAM, Oct. 21, 1869.

OBITUARY.

DR. R. N. RUBIDGE.—We receive from Port Elizabeth the painful intelligence of the sudden death (on the 8th August), of R. N. Rubidge, Esq., M.B. Lond., F.G.S., etc., who was well-known as an enthusiastic labourer in the geology of South Africa. Beginning his medical studies under Dr. John Atherstone, of Port Elizabeth, his habit of accurate observation was acquired and fostered in company with his fellow pupil and friend, Dr. W. G. Atherstone, of that town, also known as an ardent and successful geological explorer of South Africa, sometime in company with the late Mr. A. G. Bain, who first worked out and mapped the geology of that region.

In 1854 Dr. Rubidge was requested by the merchants of Port Elizabeth to visit and report upon the newly discovered gold-diggings near Smithfield, in the Orange River Sovereignty. In company with Mr. Paterson he made a careful examination of the spot, and found that gold in small quantities was associated with quartz in the meridional set of trap-dykes there intersecting the Dicynodon or Karoo beds. In his clear and concise communication of these results to the Geological Society of London (*Quart. Journ.*, vol. xi., p. 1, etc.), Dr. Rubidge mentions a fact that may be of interest in connection with the possible origin of the diamonds that have of late