district. The principal measurements of the glacier as given by Professor Reid's survey are a length of 35 miles, a width varying from 6 to 10 miles and an area of 350 square miles. The thickness is 900 feet at the seaward end, and is much less than had been stated. The glacier slopes upward at 1° 15′ towards the nevé fields; the mountains around the glacier are from 5,000 to 7,000 ft. in height. The glacier is now receding very rapidly, and has retreated 1,000 yards in four years, a rate which far surpasses that ever attained by the Rosenlaui Glacier; its greatest extent was reached about 150–200 years ago. Around the fiord there is plenty of evidence of submerged forests, and Professor Reid therefore suggests that the diminution in the ice has been due to subsidence. The ablation is at the rate of 2 ins. a day, a measurement of much interest as reliable estimates for the Alaskan glaciers have been so far wanting. One of the most important parts of Professor Reid's work was his measurement of the rate of motion; this was calculated by Professor Wright at 70 ft. a day. Professor Reid's careful observations, however, show that this was enormously exaggerated, and that the very highest speed is 7 ft. 2 ins. a day. In a line across the glacier, a little above its mouth, the average daily motion was as follows: 4 ins., $2\frac{1}{2}$ ft., $5\frac{3}{4}$ ft., $6\frac{1}{2}$ ft., 4 ft. 8 ins., 6 ft. 1 in., 7 ft. 1 in., 7 ft. 2 ins., 6 ft. 2 ins., 4 ft. 9 ins., and 7 ins. The estimate of the amount of erosion that the glacier effects on its rock bed is also of interest. Professor Reid estimates that it amounts to as much as three-quarters of an inch per annum. The paper is illustrated by a series of photographs, which, though many of them are greatly over exposed, admirably depict the principal features of the greatest of the glaciers on the American mainland. J. W. G.

CORRESPONDENCE.

SHAPES OF SAND GRAINS. FLEXIBLE SANDSTONE.

Sir,—Mr. T. Mellard Reade in his interesting article on "Glacial Geology," in the July Number of the Geological Magazine refers —page 314—to the evidence afforded by the shapes of sand-grains in enabling us to determine the marine or fresh-water character of the deposit of which they form a part. As I have devoted many years to the study of Sands, perhaps I may be permitted to make a few remarks upon the subject.

Like Mr. Mellard Reade, I have examined Sands from many parts of the world, and I can endorse his views respecting the (generally) more-rounded appearance of marine sands than river-borne sands. I have found, however, that nearly all river-borne sands have a large percentage of *cylindrical* and *tabular* grains, while in wave-borne sands (remote from rivers) the percentage of such grains is very small. I have frequently explained what I believe to be the cause of this, and thence the value of the fact in enabling one to distinguish between those sands deposited by rivers, and those deposited by waves.

Mr. Mellard Reade states that "Blown-sand of sand-dunes is not distinguishably more worn than the sand of the shore from which it is derived." I do not know what particular dunes are referred to, but I must say that my experience is quite the reverse of this. Blown-sands of deserts and dunes procured from many parts of the world have never yet failed to provide me with characteristically-rounded grains in great abundance.

Of course much will depend on the particular spot from whence samples are procured. Grains freshly blown up from the shore on to the surfaces of dunes would not become appreciably rounded until they had travelled some distance inland, and had been whirled about in hollows and depressions for some length of time. The places to find rounded grains of blown-sand would be, therefore, in such depressions some distance from the shore, and I feel sure that anyone collecting samples from such spots will confirm my opinion. It must be clear that the action of the wind *in time*, by hurling the grains one against the other, would produce (in the case of quartz) sphericity through abrasion, and numerous sands prove this.

A fact that does not appear to be known in connection with grains of blown-sands is that many of the grains exhibit the *mastoid* markings so frequently seen on flint pebbles, and these markings clearly show with what force the grains have collided. I have never found these markings on wave-borne sand grains, simply because in the denser medium—water—the grains do not collide with sufficient force to enable them to become developed. Some years ago, at St. Agnes, in Cornwall, I found a deposit of white quartzose sand (probably Pliocene), the larger grains of which were covered with these markings, and these alone, I considered, pointed to the Eolian character of the deposit.

Before we can base any conclusion—as to the *locating agent* of a particular deposit—upon the rotundity of certain sand-grains contained therein, we must satisfy ourselves that such grains were not already rounded and polished in the parent rock from which they were derived.

In reference to Mr. Pittman's letter on "Flexible Sandstone," it does not appear to have been noticed that nearly thirty years ago Dr. Wetherell published an opinion that the flexibility was due to the grains being "arranged in definite groups separated from one another by intervening cavities." CECIL CARUS-WILSON.

BOURNEMOUTH, *July* 11, 1892.

SUBTERRANEAN EROSION OF THE GLACIAL DRIFT, A PROBABLE CAUSE OF SUBMERGED PEAT AND FOREST-BEDS.

SIR,—In December last a paper under this title was read before the Geological Society by Mr. William Shone, F.G.S., and more recently a *resumé* of it was given to the Chester Natural Science Society. The author described a section at Upton, near Chester, cut by two streamlets through Boulder-clay resting on a considerable thickness of sand. The clay sloped towards the sides of the streams,