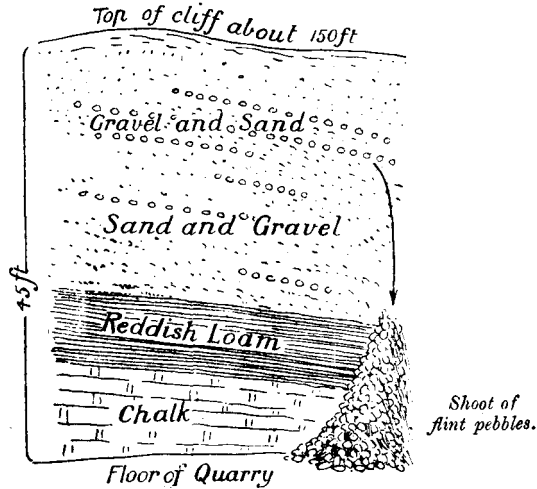


Chalk in the cliff hereabouts, and the cliff itself is much fissured and crevassed. The beds dip towards the north-east (approximately).



The elevation of the church at Trimmingham is marked in the old map as 195 feet, and the top of the cliff here is from 40 to 50 feet lower.  
W. H. HUDLESTON.

NOTE.—The mass of Chalk forming the arch (see Pl. XXVII) was only entirely isolated and detached from the adjoining cliff early in this year. (See Mr. Brydone's Plates, *GEOL. MAG.*, 1906, Pl. II, Figs. 2, 3; Pl. IV, Fig. 7; Pl. V, Fig. 12; Pl. VIII, Fig. 13. See also description by Prof. Bonney in Sept. No., pp. 400-403, Fig. 1, A, and Fig. 2.)—*EDIT. GEOL. MAG.*

#### THE THICKNESS OF THE CIRCUM-POLAR ICE.

SIR,—Your reviewer of the first volume of Professors Chamberlin and Salisbury's *Geology* has the following sentence on p. 376: "We note that the thickness of the Greenland ice-dome at its centre is estimated at 5,000 feet or more, and we recommend the statement to the attention of the writer in this Magazine (March, 1906, p. 120) who has recently, on hypothetical grounds, revived the idea that ice cannot attain a greater thickness than 1,600 feet." May I again point out that the 5,000 feet ice-sheet is a pure assumption, whereas the 1,600 feet limit rests on physical experiment and direct field observation? Professors Chamberlin and Salisbury's statement, which your reviewer refers to with such satisfaction, is as follows: "The height of the land surface beneath [the ice-cap] is unknown, but it is unlikely that it averages half this amount [9,000 feet], and hence the ice is probably 5,000 feet or more thick in the centre. There is reason to think it is much thicker in Antarctica." This is simply an appeal to ignorance; and as regards the Antarctic, Captain Scott's observation

that evaporation equals precipitation on the plateau leads one to infer that it is likely that the ice-cap there is quite thin. If the upholders of the 5,000 feet ice-sheet will produce the record of a tabular iceberg more than 1,600 feet thick, or if they will show that there is a valley 5,000 feet from crest to trough running under the flat ice-cap of Greenland—the observations at present available tending to show, on the contrary, that the deep valleys on the coast go but a short way inland and end abruptly on the edge of a plateau—then I will believe that physical laws have been suspended in their operation for the special benefit of glacialists.

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#### THE TRIMMINGHAM CHALK.

SIR,—It seems desirable to make a few comments on Professor Bonney's paper in your September number. On the question of "western and eastern" or "northern and southern" bluffs, I cannot see what the trend of the coast, ever varying from point to point and as you take it at the base or top of the cliff, can have to do with the relative position of two fixed points. A line drawn from bluff to bluff runs by the compass  $5^{\circ}$ – $10^{\circ}$  S. of S.E., so that I and any earlier writers who used *magnetic* bearings are accurate in speaking of "northern and southern" bluffs. Can it be that Professor Bonney is treating our magnetic bearings as if they were geographical, and supplying an instance of the very confusion I sought to forestall by a note obviously addressed to the general public. (Professor Bonney affects to regard it as addressed to him personally, but I can assure him that the paper by him and Mr. Hill gave rise to no alteration in the form or substance of mine.) On the East Coast it is in any case natural (and not inaccurate) to speak of points along the coastline as north and south, while they are no nearer due east and west than  $10^{\circ}$ – $15^{\circ}$  E. of S.E. indicates.

I am less fortunate than Professor Bonney in having only found one place where the foreshore chalk has a skin of boulder-clay, the plastic clay having, under pressure from the cliffs above, crept over the chalk for a few yards in a depression. It seems a very natural thing to happen.

Professor Bonney has not fully grasped my theory as to his blocks A, C, and E. I believe that the eroded surface, unconformable to the lines of flint, of the *Ostrea lunata* chalk in these three blocks was formed in Cretaceous times, and then still in Cretaceous times the grey chalk was deposited on it, most thickly in the hollows, e.g. between C and E, and in the pocket in the seaward face of A shown by my figs. 13 and 16. On this theory no twisting of the grey chalk is required, nor is there any difficulty in its occurring still at the top and bottom of the sloping face of C. (As I have stated, it formerly covered the whole of this sloping face and was continuous above the sand with the grey chalk in E.)