

CALCEOLA SANDALINA.

SIR,—Respecting the paper of Rev. T. R. R. Stebbing, “Notes on *Calceola sandalina*, Lam.,” in the February Number of the GEOLOGICAL MAGAZINE, I must call the attention of English geologists to another paper on the same subject, published 1869, in the “Zeitschrift der Deutschen geologischen Gesellschaft,” pp. 647–688, pl. xviii. and xix.

The author, Dr. Kunth, of the University of Berlin, (one of our most promising and cleverest geologists, and one of the most deplored victims of the French rifle bullets at the battle of Saarbrücken, 1870,) has explained in this paper, in a most satisfactory and complete way, as he used to do in all his papers, the structure, the law of crescence of *Calceola sandalina*, and its relation to the other Palæozoic Zoantharia rugosa, and to the recent Corals. (See also his paper in the same journal, 1870, pp. 24–43, pl. i.) This, I hope, will keep the priority to the more complete paper of Dr. Kunth.

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February 19th, 1873.

A. VON KOENEN.

THE AGE OF THE NORTH OF ENGLAND ICE-SHEET.

SIR,—In replying to Mr. Fisher’s letter in your last Number, I am happy to say that I had read his valuable papers, and with much interest; but when using the word “trail,” I meant it in its ordinary English sense, and not in that special sense to which he would appropriate it. Nor was I referring to his papers when using the word; for I am not aware that he has called attention to that particular phenomenon, the overturning of basset edges, which I was describing when I employed it. So far as I understand from Mr. Fisher’s writings, his “trail” is almost a synonym for *till*, except that he applies it to the till of what he considers a particular epoch.

Mr. Fisher objects to my speaking of “the Glacial Period”: I must be content to shield myself behind eminent geologists, who have done, and still do, the same when speaking of general glacial phenomena or of deposits of indeterminate glacial age.

As to the age of the Ice-sheet of the Irish-Sea basin, I am unable to say whether or no it is synchronous with Mr. Fisher’s Trail Period. I have already tried to show that it was subsequent to the occupation of West Yorkshire, Lancashire, etc., by the Mammoth, tichorine Rhinoceros, cave-hyæna, and cave-bear, and that these animals probably never returned to that area again.

It is quite possible that here too (as pointed out by Mr. James Geikie for Scotland) palæolithic man may have lived with these animals whose remains are associated with his works in the South of England. For certainly the complete absence of palæolithic implements and fauna over co-extensive areas which have been over-ridden by the Ice-sheet is a significant coincidence.

To whatever scene or act of the glacial drama we may assign the great ice-sheet, one thing is certain, that it was succeeded by a period of depression, well marked by marine sands and gravels up

to 600 or 700 feet in North Lancashire, and supposed by some to be shown by more doubtful deposits at greater heights.

This comparatively mild period gave place to a sea crowded with floating ice, wherein the Upper Boulder-clay was deposited on the Gravels, and perhaps on the highest islands glaciers were forming and sending off little icebergs into the channels of an archipelago. But the ice of this cold period never attained sufficient strength to plough out of the arms of the sea the sand and gravel of the preceding mild period. It could not therefore have been the agent which swept the remains of the older mammals off the face of the district, but probably belonged to the latest cold period in Britain, and I can only say that that of the Ice-sheet is the earliest of which we have any traces left in Lancashire and West Yorkshire.

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R. H. TIDDEMAN.

ON SUBSIDENCE AS THE EFFECT OF ACCUMULATION.

SIR,—Will you permit me to make a few remarks upon the critique on “Valleys, Deltas, Bays, and Estuaries,”¹ in the last Number of the GEOLOGICAL MAGAZINE?

The reviewer charges me with attributing to such small accumulations, as those of “a delta, a shingle-beach, or the ice and droppings of a glacier,” the power of weighing down gradually the crust of the earth. Such an opinion would, indeed, be “pushing a theory too far,” even to absurdity.

The accumulation in a delta represents a comparatively infinitesimal portion of the débris, derived from the disintegration of the material, formerly occupying the space that constitutes the area of a valley, and which has been removed during the process of its formation, having been carried down by the river and deposited near its mouth and *in the neighbouring sea*.

It is considered that during the Glacial Period, there were not simply Glaciers in Britain, but that the country was enveloped in a mantle of snow and ice, similar to what now exists in Greenland; and it has been estimated that in some parts it must have attained a thickness of at least 2000 feet. Supposing the weight of this mass was the same as that of a similar depth of water, it would indicate an increase of pressure on the surface of the land amounting to 937 lbs., or about *eight hundredweight and a half* to the square inch.

Dr. Robert Brown (Quart. Journ. Geol. Soc., xxvi., p. 681), states that he can find no appreciable difference between the deposit of the mud, with which in Greenland the sub-glacial streams are loaded, and that of the clay of the Boulder-clay, and it was to such a source I attributed its formation. Though its thickness in this neighbourhood is in places considerable, even after much denudation, as its deposition occurred close to a land-margin, it will probably at all times have been moderate compared with that which lies beneath the waters of the Bay of Liverpool. “The droppings of glaciers,” *i.e.* the scratched and other boulders and pebbles contained in the

¹ An abstract of this Essay was given in the GEOLOGICAL MAGAZINE, Vol. IX. p. 119.