

Anmeldelser og Kritikker.

A Protest

against the „reality“ in Mr. GEORGE SLATER's paper:
The Structure of the Disturbed Deposits of Møens Klint, Denmark.

By

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In "Transactions of the Royal Society of Edinburgh", Vol. LV, Part II, No. 12, Edinburgh 1927, Mr. GEORGE SLATER has published the above paper on Møens Klint, a paper which is, however, so devoid of all reality that I am compelled to lay down the most energetic protest, both against its contents and the manner in which it has come about.

For a great many years I have personally worked on the investigation of the grand profile of that extraordinarily interesting cliff, Møens Klint, on which I hope to be able to present all my results during the course of the coming year. When Mr. SLATER approached Denmark's Geological Survey for assistance and guidance during one or two short visits which he desired to make to the cliffs of Møen and Lønstrup, it was thus natural that I, although not attached to the institution, was requested to give this assistance as far as Møen was concerned. I was pleased to be able to help a foreign colleague and I did so, partly by placing maps and profile-material at his disposal and also by giving him a copy of what I had so far completed, and partly by travelling with him to Møen in the beginning of July 1925. I must confess that my pleasure is no longer unqualified.

Even while in Copenhagen, where we went through a part of the material, I observed that Mr. SLATER was no unwritten page but that he had already quite made up his mind about Møen, whose fine cliff-phenomena he was prepared to explain on the basis of some diminutive conditions in a small locality at Ipswich, in southeast England, which he has described but where the profile and the phenomena are in proportion to Møens Klint as a gnat to an elephant. However, I consoled myself with the thought that once he had seen the cliff, he would necessarily abandon his view. For apart from everything else, it cannot in any way be applied to Møen, where there is no covering moraine over the profile but where both the lower and the upper moraine have been involved in the dislocations, so that the cause of these is not to be found in the effects of the ice as assumed by Mr. SLATER.

It turned out as I had expected when, as the first place to which I guided him at the coast, I brought him face to face with the clear and distinct profile of Søndre Hundefangsklint. A chalk-floe, about 60 metres in thickness, is here lying thrust up over upper boulder clay, which is underlain by marine deposits (stoneless clay and fossiliferous sand), which again rest upon lower boulder clay conformably associated with the underlying chalk, which means that the whole series lies conformably upon the next cliff in the row, Nordre Hundefangsklint. Mr. SLATER stood there quite overwhelmed, and merely asked whether the mass of chalk he saw was really only a floe.

This I demonstrated to him, simultaneously drawing his attention to the upper boulder clay, over which the floe was partly thrust, and then went through with him the other Diluvial deposits — at that time, in contrast to what is the case now — lying clearly and distinctly in section. I also showed him how he might easily and with certainty distinguish upper and lower boulder clay from each other, by means of their characteristically great difference in the flints they contained, and I also pointed out that, with regard to stoneless marine clay, he must be cautious with regard to distinguishing it from lower boulder clay, which it very closely resembled when the waves had sprinkled its surface with stones. He ought therefore always to examine whether the stones continued in through the clay or not.¹⁾

On the spot I also drew his attention to the fact that the lower and upper moraine on Møen and on Rügen respectively exactly corresponded in a petrographi sense, but that there is a great difference between the Diluvial deposits of the two places; that on Møen the whole series lies conformably over the chalk, together with which it has been dislocated, whereas on Rügen this is only the case with the lower boulder clay and the marine series, the upper moraine there being unconformably deposited over the dislocated cliffs. On the other hand there is on the whole no unconformable moraine over the Møen cliffs and therefore the idea of ice influences must be disregarded.²⁾

Mr. SLATER was so enthusiastic about the section in question that I believed he had already abandoned his preconceived opinion, and I was further confirmed in this when he showed me what he had drawn and this proved to be exactly right with regard to the relation between the chalk and the Diluvial deposits. In order to avoid any misunderstanding he requested me to mark off these various deposits, which of course I did with pleasure, as in that manner one would assume that there was no chance of future misunderstanding. In a similar manner

¹⁾ Mr. SLATER reproduces this by saying that there was great difficulty in distinguishing between the lower boulder clay and the stoneless clay, and that I felt the same difficulty!

²⁾ Meddelelser fra Dansk geologisk Forening, Bd. 4, Copenhagen 1912: in Mr. SLATER'S list of literature given as No. 19.

during the three or four days we were together we went through many other parts of cliffs, where I especially pointed out the most instructive places for him, and on every point tried to advise and guide him.

After I left, Mr. SLATER remained behind another week as "being a stipendiary he was obliged to write a paper on the places he visited in this country". This paper is at hand now, and by chance it has come into my possession, the author not having shown me the courtesy of sending it to me. As Mr. SLATER mentions my name again and again in it, and even thanks me warmly for "the extremely kind way in which he [I] placed his great experience of the geology of Møens Klint fully and ungrudgingly at my [his] service", I am inclined to think that in the omission Mr. SLATER has been so considerate that he wished to spare me from seeing that I have entirely wasted my time and other things by having been his guide.

For not on one single point does Mr. SLATER'S work build upon what he saw under my guidance, and he quite incorrectly reports my opinion of the Møen dislocations, as on page 290 he says that I am of the opinion that the disturbances on Møen are the result of movements of the earth's crust and only to a limited extent and as regards the surface due to the effects of ice!

Through conversations and through literature Mr. SLATER learned that I regarded the Møen dislocations as tectonic and of post-glacial age, and I demonstrated to him my reasons. In now ascribing to me a belief in ice effects as regards the surface which I do not hold at all, Mr. SLATER has brought matters into the veriest nonsense, and in this respect I can agree with him that this view is quite untenable. But as, as I have said, it is in no way *my* view, I can only characterise it as being positively indecent that Mr. SLATER does not make the slightest attempt to disprove or refute my view which I demonstrated to him: that the disturbances are tectonic and post-glacial, but limits himself merely to a grand gesture: "entirely untenable".

I do not demand that Mr. SLATER should have paid so much attention to my opinion that he approved of it and subscribed to it in every respect; but I consider that here, as elsewhere, I am entitled to demand that in a paper that is written about a terrain which has been visited under the guidance of one who is familiar with the place, notice should be taken of what on that occasion was demonstrated in the form of actual facts, regardless of whether there is agreement or not as to the interpretation of their meaning. In general I believe that this would be done; at any rate I am convinced that matters of vital importance to the whole question would not be suppressed as in Mr. SLATER'S paper, or referred to in a manner which in no way corresponds to the actual circumstances. By this I refer first of all to Mr. SLATER'S treatment of the upper moraine, that which he learned to know so thoroughly as lying under overthrust chalk floes, for instance at Søn-

dre Hundefangsklint which he figures as Point 5 in his Fig. 1. I have already mentioned that Mr. SLATER drew this section while I was present and that on the whole he drew it correctly, which cannot be said of the other drawings he made later. I have also mentioned that at his request I marked off the various parts of the Diluvium on his drawings so that at Point 6 there was Lower Moraine and at Point 5, in under the dislocated cliff, Upper Moraine. The part between 5 and 6 was marked "marine sand and clay", or some similar term.

In Mr. SLATER'S published reproduction of this, however, all the names which at his request I inserted have been left out. Instead there is a large "B" which, according to his explanation, means "Drift", without any explanation of what this comprises.

In order not to get too far away from reality Mr. SLATER omits entirely to speak of the upper moraine, and he writes (page 298) that;

"The boulder clay on the north side of each of the V-shaped clefts is always lower boulder clay resting apparently evenly on the chalk, whereas on the other hand the southern side of the clefts is always marked by a well-developed thrust-plane".

The italics are Mr. SLATER'S, who thus apparently attaches extremely great importance to what he says here; thus it may safely be said that he has quite deliberately omitted to mention the upper boulder clay, the situation of which, below overthrust chalk-floes, would make it impossible for him to present his theory. That he quite well knows that this is the position does not improve matters, and when he says (296): "It is quite clear from the sections that the drift primarily associated with the disturbed chalk consists chiefly of the lower boulder clay associated with sand, whilst later glacial deposits fill in the ravines and basins", his words contain such gross suppressions and absolutely wrong representations with regard to the upper moraine that I do not hesitate to use strong words and characterise Mr. SLATER'S mention of it as false. But I will readily admit that, to be able to maintain his fixed and preconceived opinion, it was a vital necessity to eliminate the moraine whose position shows to any unbiassed investigator that the dislocations did not take place until after the Ice Age. Such procedure is not good scientific custom, however.

This is not the only point, however, on which the cliff is laid in Mr. SLATER'S Procrustean bed. Hitherto there has been complete concord among investigators that Møens Klint, one of our finest sections, consists exclusively of White Chalk and that there is no later chalk present at all. Comprehensive series of fossils have been collected and described and these fully confirm this view. And yet at the south end of Dronningestolen Mr. SLATER has taken a *Terebratula* out of the chalk at the foot of the cliff; this he has had classified as *Chatwinothyris* (*Terebratula*) *lens* and, as a consequence, he is of the opinion that the Dronningestolen is built up of a mixture of White Chalk and Danian! For he found a *Belemnitella mucronata* lying loosely close by, and he

considers that this must have fallen down from higher parts of the cliff.

If one did not know Mr. SLATER'S theory with regard to the formation of Møens Klint, one would simply be appalled at the ignorance indicated by his placing the Danian as underlying the White Chalk. Matters are not quite so bad, however, as it can only be characterised as incredible recklessness, coupled with unshakeable self-confidence and colossal disrespect for the work of all previous investigators, to maintain that Danian occurs together with White Chalk in Møens Cliff, and this solely on the finding of a single fossil about which one may safely say that it has been incorrectly classified. To Mr. SLATER, however, this placing of the Danian and White Chalk together is undoubtedly only a further proof of the correctness of his saving theory regarding every place he visits.

In so far as it is possible to give Mr. SLATER'S theory in few words and find the core of the apparently rather vague developments, it may be given as follows: that an ice-edge has oscillated backwards, and forwards, time after time. It has abraded the substratum and, further forward in front of its margin has deposited in thin layers the material which it has planed off farther back. Of this Mr. SLATER uses the expression: "This leads to the formation of domes or ridges and a series of spoonshaped basins".

The violent disturbances which Møens Klint has been subjected to have involved that the chalk in many places, especially in those where bends have appeared in the chalk strata, has been severely crushed. The flint beds which intersperse the chalk show us the changes which have occurred in the positions of the strata, and they also show that it has been very large chalk floes which have later been subjected to crushing. This Mr. SLATER will not recognise. It is true that he asked me questions as to the presence of the flint, but in spite of this — and he was given all information regarding it — to him the flint does not exist. It is mentioned only in one place, when referring to the Slotsgavle, which he does not regard as having been formed of accumulated material; but otherwise he does not mention it with one word.

On the other hand he attaches most extreme importance to the small floes and fragments into which the chalk has been crushed and carefully shows in the drawings the quite immaterial and accidental intervals between the various pieces of the breccia. He interprets the small pieces as belonging to the various thin beds in which the ice — according to his theory — has deposited the abraded material, and under these circumstances the presence of the flint, running contrary to his assumed thin beds, would show that his interpretation of them is at variance with reality. For this reason the flint beds are not mentioned, despite the fact that they are visible in several of his figures, although remarkably faintly in one case.

Mr. SLATER also believes that he can substantiate the existence

of the basins from which the ice has taken its material, and in this respect Grimsdalen, inside the Sandskredsfald, is strongly emphasised. On the map printed with his paper, the topography of which he credits to me, he has, by emphasising certain chance contours and omitting others, produced a picture of the desired character. This has in particular been achieved by omitting all the contours, from the sea-level and upwards, which form the cliff, so that the direct impression is that the hollow stretches down to the level of the sea. As the lowest part of the valley floor lies at a height of about 80 m, further comment would seem to be unnecessary.

I much regret having been obliged to so sharply oppose and criticise Mr. SLATER'S work, which cannot be allowed to lie uncontradicted as on more than one point it would lead to confusion of ideas regarding our peculiar and splendid profile. Despite the fact that I was approaching the publication of my observations covering a great many years, I endeavoured in every way to place myself at the disposal of a colleague from a nation which is closely related to us. In this matter, however, I do not consider Mr. SLATER to be a representative of the British nation, and in this I am justified by his treatment of the information given him and his very untrustworthy investigations. I would have liked not to have been obliged to have to occupy myself in such detail with Mr. SLATER'S work and theories, but I considered that I would be unjustified in dismissing his theory in the same gratuitous manner as he in his work has dismissed mine with an "entirely untenable".

Copenhagen 1927.
