

different data, less satisfactory on other grounds, might lead also to a less satisfactory amount of contraction or even to an expansion. This is an argument in favour of the data and of the theory, and not against them.

His assertion that I would have readers "believe that the thickness of the radio-active layer has been fairly accurately measured", and his charge of "dogmatism", are definitely untrue. It was because it is not accurately known that I determined the available compression on two hypothetical distributions of radio-active matter, both permissible on other grounds, but widely different; the results they gave were not very different and were stated in the article.

I introduced no new theories regarding the properties of matter. What I did was to classify in a convenient way the known behaviour of different types of matter under shearing stress. The statement quoted from Maxwell that liquids and perhaps most solids are perfectly elastic as regards stress uniform in all directions is irrelevant to my discussion, which was explicitly limited to the differences between the stresses in different directions. In the light of present knowledge the account of shearing stress in Maxwell's book needs revision; for it makes no reference to elastic after-working or to the elasticity of such a substance as pitch, which in my classification would be a plastic solid with a very low limiting stress-difference. The common practice of regarding as a liquid a substance so elastic that tuning forks can be made of it is exceedingly inconvenient.

Had the conclusion, that my views on the solid and liquid states are quite inadmissible, been accompanied by the slightest argument, it might have been more impressive; or it might not.

HAROLD JEFFREYS.

THE PRE-THANETIAN EROSION OF THE CHALK.

SIR,—I have read with much interest the suggestive paper by Mr. H. A. Baker on the "Pre-Thanetian Erosion of the Chalk in the London Basin". I have for some time past been accumulating evidence for a similar study, but in 1915 wrote that "the evidence . . . is as yet too slight to allow of a definite map being made" (*Geology of Windsor and Chertsey*, Mem. Geol. Surv., p. 14).

Mr. Baker's map (Fig. 1) includes the area to which I referred, and appears to be based upon less evidence than that which my work for the Geological Survey had afforded. In the construction of such a map it seems natural to ascertain as far as possible the zone of the Chalk immediately underlying the Tertiary at the boundary of the latter, and to check the zones whose presence beneath the Tertiary is deduced from borings by these facts. This has not been done by Mr. Baker. The zone of Chalk on which the Tertiary rests has been ascertained by the Survey in the south-western part of the area shown on Mr. Baker's map, and a portion of the results has already been published (op. cit.). From the neighbourhood of Beaconsfield to the western margin of the map forming Fig. 1 he shows the base of the Tertiary as resting on the zone of *A. quadratus*. The fact is, that the zone is that of *M. cor-anguinum* at Beaconsfield, *Marsupites*

and possibly *quadratus* at Taplow, *cor-anguinum* again south and west of Taplow to the margin of the area, where *Marsupites* comes on again. In this part of the area, at any rate, Mr. Baker's zonal boundaries, deduced from borings, are in marked discordance with the facts ascertained and published.

I do not, however, wish to suggest that the method of deducing the Sub-Tertiary zones from boring records is useless; on the contrary, when the amount of evidence available is larger, the method may be of some value. The results obtained by Mr. Baker show that his evidence is insufficient, but that may be because he has apparently not made use of all the evidence available. For the benefit of those interested in the subject I may add a few points not mentioned in the paper I am criticizing; all are referred to in the memoir I have quoted, while the first was published in 1886. At Egham the Chalk Rock has been proved at a depth from the surface of 700 feet, or 346 feet from the top of the Chalk, suggesting the presence of *quadratus* zone; at Ottershaw the total thickness of Chalk is known to be 646 feet, suggesting *Marsupites*; at Windsor the Chalk is exposed below the Tertiary and probably belongs to the lower part of *cor-anguinum*.

From this evidence, combined with that referred to by Mr. Baker, I inferred that the plane on which the Tertiary rests "has been cut across a series of gentle folds whose axes run about E. 15° S." (op. cit., p. 14). I do not regard the above as more than a tentative solution of the problem, and it refers only to the southern half of the area mapped by Mr. Baker (Fig. 1), but I wish to point out that his conclusions must at any rate be regarded as "not proven".

I do not understand the suggestion on p. 299 that "the Streatham-Beckton fault is pre-Tertiary". It is certainly post-Tertiary, since it involves the Tertiary strata and dislocates the upper surface of the Chalk. Whether there was pre-Tertiary movement along the same line we have as yet no means of ascertaining.

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BORN AUGUST 9, 1855.

DIED JUNE 19, 1918.

WILLIAM LOWER CARTER was born at Stafford and educated at Derby School, where he distinguished himself in Natural Science. On leaving school he commenced work in a bank, but having a strong desire for theological studies he entered as a student at Springhill College, Birmingham, matriculating with first-class honours at London University. From Springhill he proceeded to Cambridge, having gained an Exhibition scholarship at Emmanuel College, where he again took up Science classes and passed the Natural Science Tripos Examination with honours, specializing in Geology. Leaving Cambridge he spent some time at the University of Halle in Germany,