of the lateral digits of the fore-foot of an Artiodactyle Ungulate allied to the *Hippopotamus*. The genus *Dromæus* must therefore be expunged from the Siwalik fauna.

I regret having made this unfortunate misidentification; but am glad to take this early opportunity of correcting it. A note to the same effect will appear in the Introduction to the volume of the "Palæontologia Indica," quoted above, on its completion.

R. LYDEKKER.

SUBTERRANEAN CONTOURING ON GEOLOGICAL MAPS.

SIR,—The notice in your March number, by my friend Professor Benjamin Smith Lyman, of Northampton, Mass., regarding this means of expressing the underground configuration of stratified deposits would, I venture to think, have attracted wider attention if it had dealt as fully with the manner of construction as it does with the results to be gained.

A long acquaintance with Professor Lyman's own use of this system in the number of beautifully constructed maps which he has produced of Japanese and other geological regions must be my excuse for pointing out that, while the employment of the system on a large scale by another American geologist (in the Pennsylvania anthracite coalfield) is certainly evidence in his favour, the important circumstances stated in the second sentence quoted from Mr. Ashburner's report have an essential bearing upon the usefulness of these contour lines. The quotation reads thus:—"The data which are available for the construction of these maps are very extensive and very accurate." This beings so, few will doubt that in such a case plans showing true underground contours of coal beds, etc., would be most valuable charts for the guidance of all kinds of mining operations. But granting this involves the consequence that, where the data are neither extensive nor accurate, the results will be hypothetical and may be even largely based upon the safety of assertions which there is no evidence to contravene, albeit there may still be ample room for doubt.

The forms and curvatures assumed by contorted strata varying infinitely, it seems to me we may speculate upon, but cannot predict, the continuity of any conditions at depths beyond the reach of direct observation. We may trace an ellipsoid formed at the surface by the outcrop of a synclinal basin, but without further information we can scarcely foretell whether the interior rocks are, or are not, folded again and again into anticlinal and synclinal curves, overfolded or faulted, thinned away or crushed out.

If what we call contortions had as uniform proportions as basins, saucers, spoons or even casks, from any section of which something might be presumed regarding the size and shape of other portions concealed, the theory of these contour lines would be complete; but as neither the shape nor size of a contortion has relation to any standard, I do not see the advisability of laying down upon ordinary geological maps, with the semblance of accuracy, what

are merely *possible positions*, amongst many others at which a concealed stratum might be found.

This element of uncertainty, it is true, affects the absolute accuracy of many geological sections, if not of most—in an unavoidable way, for which reason it would be wiser to reduce than to multiply sources of error.

A geological map is in a sense pictorial, and the more so the more easily understood: competing interests destroy such pictures as contain them by creating confusion; hence, is it not better to struggle on with existing difficulties in order to convey surface observations intelligibly, than seek to overlay our maps with a complex of subterraneous assertions—save where necessity and data may both exist, as in the case of mining plans for special purposes.

Supplementing facts with fancies may possess a charm, but the tendency is dangerously apt to degenerate, or lead us into paths which geological observers of orthodox principles are as yet not imperatively called upon to tread.

Lest these remarks should be considered captious, let me express a hope that Professor Lyman will further favour your readers with information as to how the positions for contours may be accurately ascertained at depths far removed from observation, amongst highly contorted or disturbed strata? And also as to whether he would advise the use of distinct plans on which to record the positions of the contours at the various depths, when ascertained.

KINGSTOWN, *March 11th*, 1885.

THE CLASSIFICATION OF THE JURASSIC SYSTEM.

SIR,—If Mr. Jukes-Browne is satisfied with the argument that because a lithological change does take place, in England, France and Germany, about the line of division between the Cornbrash and Oxfordian, therefore this is a good line of separation between Middle and Upper Jurassics, and one with which most English geologists will be satisfied, I fear it is useless for me to argue further. The statement about the lithological change is true in a certain sense, but it is one of those unscientific half-truths that ignore the main facts. Amongst the facts ignored in this case are the following: The lithological change in Germany from the argillaceous beds of the Brown Jura below to the calcareous strata of the White Jura above is precisely the reverse of that which takes place in North-Western France and England, and the horizon where the change takes place is not the same, in fact the two changes have no connection with each other. So purely local are the lithological conditions on which Mr. Jukes-Browne relies that the argillaceous Upper Jurassics of England and North-Western France are represented even in Central France by calcareous beds.

I did not attempt to enter into the classification of minor subdivisions like the Lower Calcareous Grit. But when Mr. Jukes-