numerous slickensides which plunge steeply to the north. In thin section the gneisses show brecciation, displacement along joints, intense secondary alteration of some of the original mineral constituents, and many veins filled either by quartz or by calcite.

The effects of the fault, particularly on the tough, crystalline Moine gneisses, are of such severity that they indicate the presence of a major dislocation. Horne, however, considered that the Sluie fault was of small throw (probably of the order of 100 feet) since he claimed to have observed patches of basal Upper Old Red Sandstone in the walls of the Findhorn gorge immediately to the south of the fault. Careful re-examination of the gorge for more than a mile to the south of the fault at a period of unusually low water failed to reveal any such outlying patches. Locally, however, the Moine gneiss is heavily red-stained by solutions percolating downwards from the drift and a specimen of red-stained rock, superficially similar in aspect to Old Red Sandstone, was collected from the lip of the gorge upstream from Sluie; on close examination the patch was seen to be typical Moine gneiss, a conclusion later confirmed by microscopic inspection of a thin section.

There is thus no evidence to support Horne's contention that the Upper Old Red Sandstone occurs immediately to the south of the Sluie fault, and his inference as to the small throw of the fault is consequently unjustified. Further, what evidence there is strongly suggests that the Sluie fault is likely to be a dislocation of some magnitude.

As the only known exposure of the Upper Old Red Sandstone–Moine junction within the area is the fault junction at Sluie, it is conjectured that on its entire southern boundary, to the south of Forres, the Upper Old Red Sandstone is faulted against the Moine Series. The trend of the junction over its entire length of three miles is, on the available evidence, consistent with this interpretation.

There is thus no evidence for the southwards transgression of the Upper Old Red Sandstone on to the Moine gneisses nor is there any direct evidence for the existence of an unconformity separating the Middle and Upper Old Red Sandstone in western Moray, nor indeed anywhere south of the Moray Firth.

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19th November, 1956.

EROSION SURFACES IN UGANDA

Sir,—I have read with great interest the paper on " Slope Form and Erosion Surfaces in Uganda " by J. W. Pallister which appeared in your issue of November–December, 1956. In this he refers to the short published summary of the work I did on the erosion surfaces of Uganda (McConnell, 1955) and argues that I was wrong in separating the Koki Surface from the Buganda Surface as two separate cycles. This is a question which I investigated in some detail as my interpretation differed from that of my predecessors, and I would be grateful, Sir, if you would allow me to state my views more fully.

Erosion forms in tropical climates differ in many respects from those in temperate zones, but a fairly wide experience of land forms in Europe, America, and Africa has convinced me that there are general rules which are universally applicable. In particular, I think that the notion of the peneplain or erosion surface is well established and the extent of these features can be recognized, even in dissected country, by correlating well-marked bevels at equivalent altitudes, provided that the distances involved do not exceed the order of one to two miles. In Uganda the presence of a thick laterite duricrust capping has rendered certain dissected surfaces very conspicuous, and of these the Buganda and Koki Surfaces are outstanding. The remarkably flat and table-like appearance of these surfaces should not, however, prejudice the recognition of other levels which are without a lateritic capping but which in other lands would be regarded as convincing surfaces. Pallister has himself (loc. cit., p. 466) referred to the absence of the duricrust under certain conditions.

The difference between Pallister's views and my own can be well explained by reference to text-fig. 2 (*a*) of his paper (p. 468). Here he presents the Koki Surface at about 4,700 feet in the neighbourhood of Lyantonde, and the Buganda Surface at about 4,300 to 4,400 feet near Masaka, about five miles distant to the east, both with a conspicuous laterite " carapace ". In between he shows what he considers to be a collection of " lowered summits " at about 4,400 feet. Lowered summits, represented by rounded cones, are certainly present at a variety of altitudes in this area, but there are also flat-topped hills and bevelled ridges which mark the continuation of the Buganda Surface at an altitude of approximately 4,400 feet to the west of Masaka and right up to the base of the scarp of the Koki Hills. These bevels are not capped by duricrust and are therefore not as conspicuous as those near Kampala, Masaka, and Lyantonde but are none the less easily recognized as bevels. This area is adjacent to a main road and I have had the privilege of pointing out these bevels in the field to such experienced geologists as Dr. F. Dixey and Professor W. Q. Kennedy, and they have agreed with my interpretation.

Bevels of the type just described at the fairly uniform altitude of 4,400 to 4,500 feet surround the Koki Hills on three sides, and in fact clearly enter embayments of the Koki Surface. One such embayment was mapped by A. Hatton below Nakisaja in the Kabula area and, exceptionally, is capped by a laterite carapace. The Koki Hills formed a watershed during the Buganda Cycle and the valley-floor peneplains of Buganda age which penetrate these hills slope sharply upwards with the usual concave parabolic curve and are recognizable up to altitudes of 4,600 feet.

In postulating the equivalence of the Buganda and Koki Surfaces Pallister invokes warping to explain the difference in altitude. Warping has certainly occurred in Uganda, and in my paper (1955) I had already pointed out the downwarping of the Buganda Surface which is quoted by Pallister (p. 471). I also consider that the Ankole Highlands, to the south and west of the Koki Hills, have been upwarped, and that here the Buganda and Koki Surfaces can be recognized at increased altitudes. The scarp between the Buganda and Koki Surfaces to the south, east, and north of the Koki Hills is, if the bevels uncapped by laterite are taken into consideration, too intricate to be ascribed to warping. In my opinion the geomorphological relationships are here very different to those prevailing to the north of Lake Victoria although Pallister compares them in his text-fig. 2 (p. 468).

As I have not been able to publish the photographs, diagrams, and maps which would illustrate the evidence on which my paper on the erosion surfaces of Uganda (1955) is based, I hope that this letter has clarified the reasons which made me decide to regard the Koki and Buganda Surfaces as representing two distinct cycles.

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11th January, 1957.

FLOW-MARKINGS AND LODE-CASTS

Sir,—In a recent paper by one of us in this Magazine it was claimed that confusion has arisen around the terms " flow-marking " and " load-cast ", and it was proposed to revive the term " flow cast " of Shrock for some structures which might have been described as " load casts ". These remarks have led to correspondence between us, the outcome of which is a compromise which may prove of interest to your readers.

We agree that the sole markings of greywacke and sandstone beds may be due to a variety of causes, and as these may operate in combination a certain ambiguity of nomenclature is inevitable. In the course of deposition of a bed of sand on a plastic mud surface, at least five processes may occur; these are:—

(*a*) Grooving leading to *groove casts*, long straight furrows filled by the sand.

(*b*) The cutting of lobate incisions into the mud surface, which incisions are subsequently filled by sand. This process is *fluting*, and the resulting cast structures are *flute casts*. We agree with Crowell that this latter term is preferable to " flow markings " which might comprise other structures than those for which Rich introduced it. Flute casts will thus truncate the laminae *below* them, and *within* them the laminae will be undisturbed, either horizontal or current-bedded.

(*c*) The horizontal movement of the base of a bed of sand during or after its emplacement on a mobile substratum, combined with sinking and ploughing up of the latter. This might be called *flow*, and the resulting structures *flow casts*. It is not certain that Shrock envisaged this process in coining the term; though he does cite Earp and Sorby who did invoke sediment flow, and his figures 117 and 118*c* represent structures which appear to have slid into position. It is clear that in these structures the laminae below and above the cast surface will be equally involved and that the structures must be pulled over in the direction of flow.

As turbidity currents build up their deposits gradually they do not normally give rise to a viscous deposit flowing over and covering a sea floor. Hence, flow casts are rare and restricted to localities where post-depositional movement ensued. But some current drag occurs within a sandy bed as it is formed by a turbidity current. This does not usually leave a visible record, except when superimposed on other sole markings which then become asymmetrical in the current direction. This may be the origin of the asymmetry in the small features Walton (1956) has called " flame structures ".

(*d*) The vertical adjustment of the basal material to unequal loading. The relief of the lower surface causes it to sink into the underlying mud which is of lower density. Part of the structures described by Shrock as flow casts belong in this class.

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