

the same is true of the *Mastodon* of the Norfolk stone-bed. The remains of the Forest-bed are in the hands of Mr. Boyd Dawkins, who doubtless will not allow them to be mixed up with Crag or Bone-bed specimens.

E. RAY LANKESTER.

HAMPSTEAD.

#### SUGGESTIONS ABOUT DENUDATION.

STR.—Your number of this month (p. 109) contains a clever paper by Mr. Kinahan. With one exception, I agree with everything that he has said. The exception relates to what Mr. Mackintosh has dubbed “My hard-gorge and soft-valley theory.” I think that Dr. Hooker’s terraces are *patches* of alluvial plains (or river haughs) sliced into terraces, and not filled-up lakes. Alluvial plains, properly so called, are deposited by the overflow of rivers upon flat dry ground, and not in hollows like filled-up lakes. Take the engraving of Dr. Hooker’s terraces. On the left of the river, as you look at it,

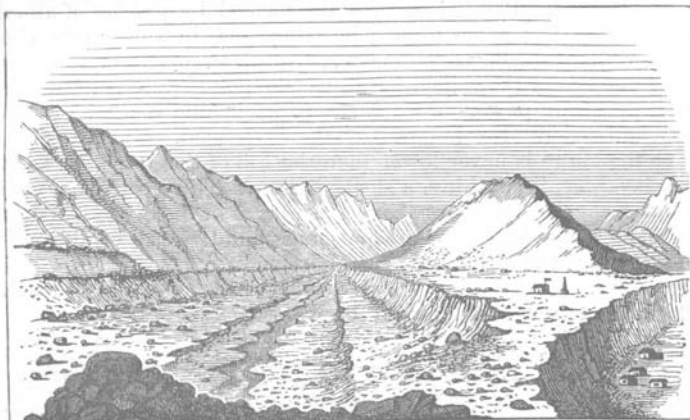


Diagram of the Glacial Terraces at the Fork of the Yangma Valley (copied, slightly reduced in size, from Dr. Hooker’s Himalayan Journals, vol. i. p. 219).

are four terraces. Number them 1, 2, 3, 4 from the river. No. 1 is now being formed in precisely the same way as all alluvial plains, and as all the preceding terraces have been formed. That is, by deposit from the overflow of the river on to the dry flat surface of the terrace, which also receives the waste of the sides of the valley and of the old terraces. No. 2 forms the banks of the river when in flood, and is *vanishing* now in precisely the same way as the preceding terraces have vanished. That is, the flooded river pulls the loose banks down, till No. 2 is driven against the side of the hill as No. 3 has been driven there. No. 1 then extends to the hill-side, and is added to by every flood till the bed of the gorge is lowered. Then No. 1 shares the fate of No. 2, 3, 4, and a new alluvium is formed at a lower level and at the expense of No. 1. Mr. Kinahan asks “what causes the barrier?” Any comparatively hard strata which cross the stream below softer strata. Even the

soft Chalk of the North and South Downs form narrow gorges below the broad alluvial flats of the *softer* Weald Clay. But these Weald Clay flats are at the same level as the beds of the Chalk gorges. There are no hollows or lakes above the gorges.

The origin of all alluvial plains, properly so-called, is the stoppage of the lowering of the bed of the valley. The bed of the valley above the stoppage is then cut back perfectly horizontal at the level of the stoppage. The rain flood-water from the *inclined* sides of the valley is then checked, overflows and deposits on the *horizontal* part. The sea stops the lowering of the bed of every valley. Therefore, the parts next the sea are composed of horizontal alluvium. Take the alluvial plain of the Nile from Cairo to Syene. We know that it is raised by deposit every year. But this rising is not the result of a lake "behind a barrier." This rising of the lowest or marine alluvial plain is constant, that is, it will go on as long as the relative level of the land and of the sea remain the same, and no terraces will be formed. Parallel terraces are formed by *patches* of alluvial plain. That is patches formed in valleys cut in soft strata above gorges of hard strata, which make *temporary* stoppages of the lowering of the bed of the valley. But we do not require (as Mr. Kinahan supposes) "power to scoop out rocks behind a barrier" lower than the barrier. No hollow or lake is formed. The alluvial flat above the gorge is never lower than the bed of the gorge, it is at the same level, or, if anything, a shade higher. This principle accounts for the Kames at Carstairs above the gorges of the Clyde at Lanark, and of the Mouse Water at Cartland Crag, and I *guess* it would explain the enigma of the Eskers of Central Ireland.

GEORGE GREENWOOD, Colonel.

BROOKWOOD PARK, ALRESFORD, 6th March, 1869.

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## MISCELLANEOUS.

### GEOLGY OF ALASKA TERRITORY.

Mr. HENRY WALTER BATES, Secretary to the Royal Geographical Society, has kindly forwarded me the subjoined extract from a letter of Mr. W. H. Dall, Smithsonian Institute, Washington, U.S. to F. Whympier, Esq., Haslemere, Surrey:—"Alaska.—You can tell your scientific friends that I have settled the geological question by fossils which I got this last year near Topanica (Norton Sound): a fine species of *Platanus*, which is undoubtedly Miocene Tertiary; there are no older rocks below Nuclukayette (Yukon River). The south flanks of the Alaskan range have Triassic? and Miocene Tertiary beds."—Mr. Dall's large collections are now being arranged at the Smithsonian Institute.

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