

ELEPHAS MERIDIONALIS IN THE NORWICH CRAG.

Sir,—I must beg you to allow me space for a few additional remarks—Firstly, Mr. Gunn's "evidence" is, I may venture to say, without offence, undeniably *no evidence at all*, and the way in which Mr. Fisher uses it in building a theory is an example of a common method of the growth of error. Mr. Fisher is quite right in saying that Mr. Whincopp's collection does not contain *E. meridionalis*, nor do other equally fine collections known to me. Mr. Fisher abandoning *E. meridionalis* as a Red Crag fossil, observes—"The species, however, is abundant in the Norwich Crag, which is sufficient for my argument." I would ask here, what exactly is the mode of occurrence of *E. meridionalis* in the Norwich Crag? How many molars have been found, and in what parts of the Norwich Crag? The headquarters of *E. meridionalis* in this country are undoubtedly in the Forest-beds, and the few specimens which appear to have come from the Norwich Crag, may have been derived, or have come from a representative horizon of the Forest-bed. Why does Mr. Fisher speak of "Miocenes of the south" as furnishing *derivata* to the Suffolk bone-bed? Surely Miocenes of the north will satisfy the required conditions better.

Some of Mr. Fisher's paragraphs lead me to suppose that I have been understood as wishing to dispute the identity of the Red and Norwich Crag. This was not my intention. I quite believe that they shade off into one another—the more northern beds of the Upper Crag being newer than the southern; this rule holding good for the various localities of the Red Crag, as well as the Norfolk Crag. My object was merely to get the facts rightly stated. The truth is, that nothing is known of the terrestrial mammalia of the Coralline, or Red Crag period, *i.e.*, of a fauna cœval with the marine fauna of those deposits, and I believe the same is true for the Norwich Crag. The contents of Mr. Gunn's stone bed have no more to do with the Norwich Crag than have the contents of the Suffolk Bone-bed (two species of *Mastodon*, *Rhinoceros*, etc., Cetacean bones and nodules of Plio-miocene¹ age,) to do with the Red Crag. I should much like to see a list of Mammalian remains in addition to the *Mastodon* teeth, found in Mr. Gunn's stone-bed. The *Mastodon* does not occur in this country with *Elephas meridionalis* at all—nor in France—and we may doubt if it does so even in the Val d'Arno, since the strata may have belonged to different horizons which furnished the one to the other. The relations of—1st, the *Mastodon*-fauna of the Suffolk bone-bed and Norfolk stone-bed; 2nd, the *E. Meridionalis*-fauna of the Forest-bed; and 3rd, the Marine-fauna of the Crag, have still to be worked out, and this can only be done by keeping the three quite distinct and adhering to fact. I think I have clearly shown that the *Mastodon*, *Cetacea*, etc., of the Suffolk bone-bed are older even than a deposit (the sandstone nodules) containing *Conus*, *Cassidaria*, *Pyrula*, and *Isocardia*, in place of the more boreal forms of the Crag. The question arises as to whether

¹ This compound is used to avoid offence.

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.

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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