

CORRESPONDENCE.

THE CORAL RAG OF UPWARE.

SIR,—In Messrs. Blake and Hudleston's admirable paper on the Corallian Rocks in England, "the well-known though very inaccessible exposure of Corallian beds at Upware" does not appear to have received from the authors such careful study as those in other localities. They state that in the northern quarry the beds "dip to the south, or in an opposite direction to those of the Rag-pit, so that there is a synclinal in which are found the Neocomian sands," and they give a "presumed section," in which the said sands are represented as so situated. Now this section is not confirmed by any evidence known to me. The dip in the northern pit—so far as there is any dip at all—is northward, not southward, probably a little west of north. I verified this a few days since in the company of three friends, all fairly accustomed to geological observation. Further, any one who has watched the working of the 'coprolite' pits, knows that the Neocomian beds rest unconformably on the Coral Rag, and thin out against the side of the ridge. The road along its crest (if one may use the word), between the two pits, nowhere crosses Neocomian beds. Two small shallow pits have indeed been opened adjoining the road on the west side, a little less than a quarter and half a mile respectively south of the northern pit. These seemed to be still in the same rock as it; and thus in all respects are unfavourable to the theory of a synclinal. The position of the strata was given some years since by Mr. Keeping in this Magazine (Vol. V. p. 272), and I have since examined several sections confirming this one, with the exception that I have never myself seen the Kimmeridge Clay exposed. Again, at the present time there is a considerable patch of the base of the Gault laid bare, just west of the south end of the Rag-pit, and perhaps four yards below the crest of the limestone; that is, exactly where it should *not* be on any theory of a synclinal. The stratigraphy is puzzling enough; but, so far as the evidence goes, it appears to me rather in favour of the old theory of an *anticlinal* as represented by Fitton (Trans. Geol. Soc., vol. iv. pl. xi.). The present authors may be right in assigning to the rock of the northern pit a lower horizon than that of the southern; but I have no hesitation in saying that the evidence at present is only palæontological, and this is not strong.

The other matter is a personal one, and refers to their mention of my own account of this district. I am well aware that in my *Geology of Cambridgeshire* it was "partially, but not very fully, described," because the book only professes to be a sketch for the use of students. At the same time, when authors call attention to an imperfection, one may fairly expect that they will considerably augment our stock of knowledge. I venture to assert that the questionable statement discussed above is the only material addition contained in the paper on the Corallian rocks. The two accounts are about equal in length, and contain as nearly as possible the same facts. Again, the authors' statement about the position which I

assign to the Upware rock is, I think, so worded as to convey a wrong impression. "He correlates it with the lowest portion of the Corallian region, on account of its containing *Cidaris florigemma*, a reason which would make us assign to it nearly the highest." This, coupled with the rest of the paragraph, and their use of the word Corallian, would give rise, I think, to the supposition that I had placed the Upware rock below the Coral Rag. On the contrary, I take some pains to prove it to be Coral Rag, and the only support for this statement is that, as I was contending against Mr. Seeley's attempt to place the bed in the Kimmeridge series, and as *C. florigemma* was then supposed to characterize rather the lower part of the Coral Rag, I point out that the affinities of the Upware rock are downward rather than upward, so that it cannot even be paralleled with the Continental Séquanien. It is true that, according to Messrs. Blake and Hudleston, the position of the zone of *C. florigemma* is less constant than it was supposed to be; but in reasoning on that point, I used the best information to be obtained at the time, and the change does not materially weaken my main position that the Upware limestone is true Coral Rag, as the word was then understood.

ST. JOHN'S COLLEGE, CAMBRIDGE.

T. G. BONNEY.

THE ORIGIN OF CIRQUES.

SIR,—In a recent number of the GEOLOGICAL MAGAZINE (p. 273), Mr. Bonney has replied to the arguments adduced by Mr. Helland in favour of the glacial origin of cirques (Quart. Journ. Geol. Soc., vol. xxxiii. p. 142), and has adduced many cogent reasons in support of the explanation he has previously given, viz. "that the cirques are mainly produced by the combined erosive action of streamlets."

May I be allowed to cite what I conceive to be an illustrative case, occurring in a country which I have lately visited, and where it would be difficult to discover any traces of ice action, but where the erosive power of torrential rains is markedly exhibited? I refer to Upper Egypt, and especially to that district lying between the valley of the Nile and the Red Sea.

The eastern bank of the Nile above Cairo is bordered by a desert plain, about three or four miles wide, and stretching up to the high cliffs beyond, which rise into mountains some 600 or 700 feet high, and form the range known as the Arabian chain. These cliffs are furrowed by numerous deep gorges and valleys opening on to the desert plain below, over which is spread out the detritus brought down from the hills; for Egypt is not the rainless country it is sometimes represented to be, and in winter-time rain falls occasionally in quantity sufficient to convert these dry valleys into rushing torrents; thus among the recesses of the bare and barren limestone rocks, into which the valleys lead, signs of water-action are everywhere visible. A cirque in such a land as this could hardly be formed by any other agency than that to which Mr. Bonney attributes them, and yet a very cirque-like hollow came under my notice while exploring one of these ravines. I had ridden some distance along