

the section on Trilobites might be criticized for undue brevity, and for the omission of all reference to British work (except for a small paper by the late Dr. Cobbold) during what were, in fact, two rather prolific years. In general, however, the obvious difficulties of furnishing an adequate yet reasonably brief critical survey of two years' work have been admirably surmounted, and the new journal may be welcomed as a distinctive and useful guide to recent advances in Palaeontology.

O. M. B. B.

CORRESPONDENCE.

THE KIRMINGTON SECTION.

SIR,—It should interest all glaciologists to know that a first-rate section can now be seen in the little clay-pit at Kirmington in North Lincolnshire. No reminder is needed that this is the one spot in all England where the late G. W. Lamplugh held that there was a case for interglacial marine sediments.

When Lamplugh last wrote on this matter,¹ the all-important upper bed of boulder-clay, covering laminated shelly silts, was no longer visible, though he did not dispute its presence in earlier excavations. At a recent excursion of the Yorkshire Geological Society, led by Mr. C. F. B. Shillito, it was found that this boulder-clay had reappeared, and a knife-edge contact with the underlying gravel and sand (beneath which are the lead-coloured shelly clays) could be studied in close detail over a stretch of 20 yards or more. Although only 4 or 5 feet thick, a more typical boulder-clay could not be desired—quite unbedded, with a stiff dark red matrix, showing no signs whatever of incorporation of the underlying strata. As for the latter, certainly the top of the gravel and sand was eroded, but there was not the least trace of crumpling, thrusting, or movement of any kind. Now this is what we see in the vast majority of boulder-clay contacts with underlying sands, gravels, silts, and leafy clays, throughout North-Eastern England. Personally, I cannot see how such strata can be explained other than as a single englacial "melt", working its way upwards through the complex contents of a stagnant ice-sheet—the boulder-clay representing the englacial dirt, the sediments gathering as the "melt" made its way upwards through the clear ice patches. I exclude the apparently continuous bed or beds of "Middle Sands", which have a different origin, though they also belong to the one "melt".

The Kirmington sediments are known, through the British Association's borings, to rest on 61 feet of alternating boulder-clays and silts before the Chalk is reached. If they belong to a lens of

¹ *Trans. Hull Geol. Soc.*, vi, pt. v, 1925.

transported material, lying near the top of this considerable sequence of glacial deposits, then it seems reasonable to look on the whole series as a single "melt", only noteworthy in that the "raft" near the top is larger than usual (though larger ones are known elsewhere). If, on the other hand, they are *in situ*, then, as Lamplugh pointed out, there must have been a marine submergence of 100 feet or more, of which no sure record exists elsewhere in Eastern England—no record, at any rate, by shells or other marine organisms. Granting such a submergence, and that lack of confirmation only marks a deficiency in observation, even then the contacts suggest that the covering boulder-clay must be englacial dirt, quietly melted out from floating ice on to the sands below. The gravel may well have come from preliminary showers of such material, small enough to be washed clean. There *are* signs of disturbance and incorporation at the boulder-clay-gravel contact in an immediately adjacent pit (we see here a zone of gradual transition, about 1 foot thick), and that this should be so in one pit and not at all in the other, surely suggests a grounding berg or an irregular melt rather than the moving-in of a whole ice-sheet.

In any case, whether *in situ* or not (and I am inclined to think not), it looks as if the shelly clay of Kirmington is of late-glacial date, not interglacial. But I would like all interested to see the section as it is at present, for, in Lamplugh's concluding words, "any time spent upon the investigation of the Kirmington episode may produce results of wide consequence."

R. G. CARRUTHERS.

NEWCASTLE.

8th February, 1938.

THE ZONAL POSITION OF THE ELSWORTH ROCK.

SIR,—With regard to previous correspondence on this subject, will you allow me to point out that in my opinion Dr. Arkell is wrong in his interpretation of *Amm. cordatus* and therefore in his use of the term *cordatum* zone? Only chaos can result from Dr. Arkell's gratuitous alteration of previous revisors' work on this and other Corallian ammonites, for example, *Amm. serratus*. The reason given for wishing to alter the interpretation of the former species seems to me exactly the reason for not altering the latter. His *plicatilis* zone also is to me merely a meaningless assortment of heterochronous and incompletely known local developments. In the circumstances I am afraid that the general reader will not greatly benefit by any discussion involving these zones; but it seems clear that Dr. Arkell does not realize how incompletely Upper Oxfordian time is represented by the Corallian deposits of England. Since Dr. Arkell himself again listed species (like the