with Dr. Dwerryhouse, but nothing comparable with the scale on which the gravel and concrete hunters work to-day. The dimensions of the exposure and the rapid rate of working provide an excellent opportunity for studying structures only rarely to be seen in this country, and make it imperative that some competent glaciologist should watch the progress of the work and record the structures revealed in the developing face.

A. AUSTIN MILLER.

DEPARTMENT OF GEOGRAPHY,
THE UNIVERSITY,
READING.
6th September, 1948.

BATHONELLA AND *VIVIPARUS*

SIR,—Dr. Cox has put forward arguments in favour of regarding *Valvata comes* from the Viviparus Marl of Oxfordshire as a marine species of another genus. Dr. Yen contends that the *Viviparus* itself (*V. langtonensis*) is a marine species of his genus *Bathonella*. It therefore seems desirable to place on record the occurrence of two forms from the Viviparus Marl that are more certainly of freshwater origin. From samples collected at both Castle Barn and Sharp's Hill, the Marl has yielded an undescribed species of the ostracod genus *Metacypris*, and the gyrogonites of a Charophyte. Recent Charophyta are exclusively freshwater. Recent *Metacypris* inhabit the almost freshwater broads of the Fenland. Both Charophytes and *Metacypris* are abundant associates of *Viviparus* and *Valvata* in the Cherty Freshwater Beds of the Middle Purbeck of Dorset. At the same time, it must be admitted that I have also found gyrogonites (but not *Metacypris*) in certain members of the underlying Sharp's Hill Beds usually regarded as marine.

P. C. SYLVESTER BRADLEY.

DEPARTMENT OF GEOLOGY,
ST. GEORGE'S SQUARE,
SHEFFIELD, 1.
2nd October, 1948.

BATHONIAN AMMONITES

SIR,—I am anxious to examine for a monograph in preparation all ammonites from the Fuller's Earth, Fuller's Earth Rock, Stonesfield or Cotswold Slates, Great Oolite, Forest Marble, and Cornbrash. If any collector or curator will send me material on loan it will be gratefully acknowledged and carefully returned as soon as examined. Ammonites are so rare in some of these formations that even a fragment may be something new and stratigraphically important if accurately localized.

W. J. ARKELL.

SEDGWICK MUSEUM,
CAMBRIDGE.
11th October, 1948.

EAST ANGLIAN DRIFTS

SIR,—Mr. Baden Powell's paper on East Anglian drifts [1] adds greatly to our knowledge: his data, which must have cost much time and labour to amass, will, I feel sure, be of permanent value. Nor would I quarrel with his sequence, if the Hoxne beds could be placed on top of all, not in the middle. But though in accord with current practice, the four glaciations claimed, with their appropriate intervals, can, and should, be challenged.

[1] D. F. W. Baden Powell. The Chalky Boulder Clays of Norfolk and Suffolk. *Geol. Mag.*, Oct., 1948, pp. 279–296.

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Otherwise opinion, which has advanced greatly since W. B. Wright's "*certainly two, probably three, possibly four*", *may petrify into dogma.*

Joining an International Congress excursion, I recently saw some leading sections, taking two days off to re-examine the more critical ones on the coast, at Corton and Happisburgh. Little enough for a region so intensively worked over as this, but then no observations ever seem to have been made there on what I cannot help feeling are key matters, the purely physical evidences for or against retreat and re-advance. Orthodoxy has always neglected such things, to its detriment north of the Wash. Discoveries, then, were likely in East Anglia, and might be instructive. So, indeed, it proved.

This is no place to detail the evidence, but, in brief, only the local basement beds, such as the Cromer Tills on the Norfolk coast, or the Lowestoft (Chalky-Jurassic) Till around Ipswich, showed that disturbance and incorporation which one expects to see when a great ice-sheet moves forward over open country, whether frozen or not. Elsewhere the under-contacts of higher tills, whether at Corton or Happisburgh, and also a clay-strip within the Corton Beds, showed roof falls on to sands gathering below, thereby betraying the undermelt of a composite ice-sheet. Confirmation was given by the supposed lake silts amongst the Cromer Tills at Happisburgh, which are shear-clays (once the banded dirts of an ice-sheet) beyond all doubt. There was no sign even of oscillation, much less re-advance, anywhere. As for the *highest till, the Hunstanton Brown Clay, few, I think, would doubt its* correspondence with the Hessle of the north: both in position and content the two agree, and the flats of The Wash alone divide them. My reasons for denying a separate glaciation to the Hessle Clay have recently been published,[1] and with that there remains no motive for regarding the whole East Anglian sequence as other than monoglacial, though with changes of direction, as in the north country too. When seeking further glaciations in Britain we shall have to content ourselves with the little "Moraine" or "Highland" episode (or episodes), affecting only the mountain tracts.

A word about Hoxne, which interested me greatly as the site of that rare thing, a true lacustrine deposit. No doubt it has been put in the heart of the series because it was thought that East Anglia held a full Continental sequence of glaciations, and the flint implements (as I would agree) pointed to a midway position therein. But Clement Reid had sound reasons for making Hoxne "post-Glacial", using that term in a purely English sense. The thin stony cover which has appeared since his time, as the workings got into higher ground, I certainly regard as a solifluxion wash, slight though the surface relief is hereabouts. Though I would date the Hoxne lake after all the tills, still, on a wider view, that only means that it came after the Saale, chief of the four North European glaciations, and seemingly *our only one in Britain (away from the Highlands and their counterparts). The two* cold periods at Hoxne are periglacial features associated with European re-advances not seen in this country save in the mountains. The Thames Valley evidence, so ably summarized by Messrs. King and Oakley,[2] gives the story in full, starting with the Lower Gravel of the High Terrace, after our main glaciation had ended. British Interglacial deposits, then, are to be sought in what an older generation would call post-Glacial sediments, and not within the tills, even at Kirmington.

R. G. CARRUTHERS.

HIGH BARN,
STOCKSFIELD-ON-TYNE.
14th October, 1948.

[1] *Proc. Yorks. Geol. Soc.*, xxvii (1948), 149–154 and 164. This address, the first part of which appeared in 1947, gives my matured opinion on Glacial Drifts in general.

[2] W. B. R. King and K. P Oakley. The Pleistocene Succession in the Lower Part of the Thames Valley. *Proc. Prehist. Soc.*, 1936, 52–76. (The glacial correlations offered were necessarily those current at the time.)

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