ISSN 1750-855X (Print)
ISSN 1750-8568 (Online)

Field Meeting Report: Preston Brockhurst and Bridgnorth, led by David Thompson 5th September 1993

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FARR, K. (1994). Field Meeting Report: Preston Brockhurst and Bridgnorth, led by David Thompson 5th September 1993. *Proceedings of the Shropshire Geological Society*, **10**, 22–25. The purpose of the field meeting was to introduce the variety of Permo-Trias "red bed" geological features outcropping within area of Preston Brockhurst and Bridgnorth.

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INTRODUCTION

How many people have driven past the red sandstone cuttings in Bridgnorth and murmured carelessly to their passenger in the back: "Cross bedding: desert dunes, you know". Yet, if pressed by a precocious relative, to "describe *exactly* what is happening in That Section" would feign selective deafness? After all, That Section is festooned with beds, some dipping this way, some dipping that. Some are curved, others straight. Some have steep dips, others are almost horizontal. And, despite the term Red Beds, a number of them are yellow, grey or green.

The purpose of this excursion was to investigate the Kinnerton-Bridgnorth Sandstone Formations (?Permian) and the overlying Chester-Kidderminster Conglomerate Formations (?Lower Tias) in the Cheshire and Stafford-Worcester Basins, also to investigate the various recently-published hypotheses of the Permo-Trias beds around Shrewsbury and Bridgnorth. The "old" view (Shotton, 1937; 1956; Wills, 1950, 1956) is that the dunes were created by strong, steady, prevailing easterly winds in desert latitudes when Britain was just north of the Equator. The "new" hypotheses (Sneh, 1988; Karpeta, 1990) suggest that these easterlies fluctuated both in strength and direction and were frequently replaced by more northerly winds. The interaction of these two components produced complex superimposed systems of dunes and erosional scours.

The excursion yields evidence at a number of localities to support the latter hypothesis, with observations of wind-eroded troughs having approximately north-south axes scoured into a system of westerly-advancing dunes. It is also possible to pick out a number of secondary and even third order structures superimposed on the dunes and to interpret the processes that had probably produced them. However, despite attention from geologists for many years, there are still unanswered questions concerning the exact mechanisms of formation of particular structures.

Figure 1 illustrates the localities to be visited around Bridgnorth and the inset maps show the dunes in Arran and the North Sea.

The meeting point was Rockhall road cutting on the B5063 immediately south of Besford Wood near Preston Brockhurst [SJ 541 523].

LOCALITY 1: Rockhall road cutting [SJ 541 523]

The first locality of the day was chosen to illustrate clearly the difference between large-scale, coarsely laminated, high-angled barchanoid dune foresets and a sub-horizontal, finely-laminated interdune facies known as wind ripple or "pin-stripe" lamination.

The top of the Kinnerton Sandstone is well exposed immediately below the Chester Pebble Beds Formation (fluvial ?Lower Trias) which forms Besford Wood (Hill) to the north. In the Kinnerton Sandstone Formation flatbedded, bottomset, laminated, sometimes trough-scoured, medium and coarse sandstone (aeolian interdune sand-sheet sediments) are preceded and succeeded by large-scale crossbedded sandstones (wind-ripple laminated, slip-faced and slip-faceless, complex dunes or draas with superimposed smaller scale aeolian dunes – effective palaeowinds from the east) (Steele, 1982; 1983).

Trace fossils (burrows and/or plant stems) have also been observed in the flat bedded sandstone beds, although no spores have yet been found with which to date them.

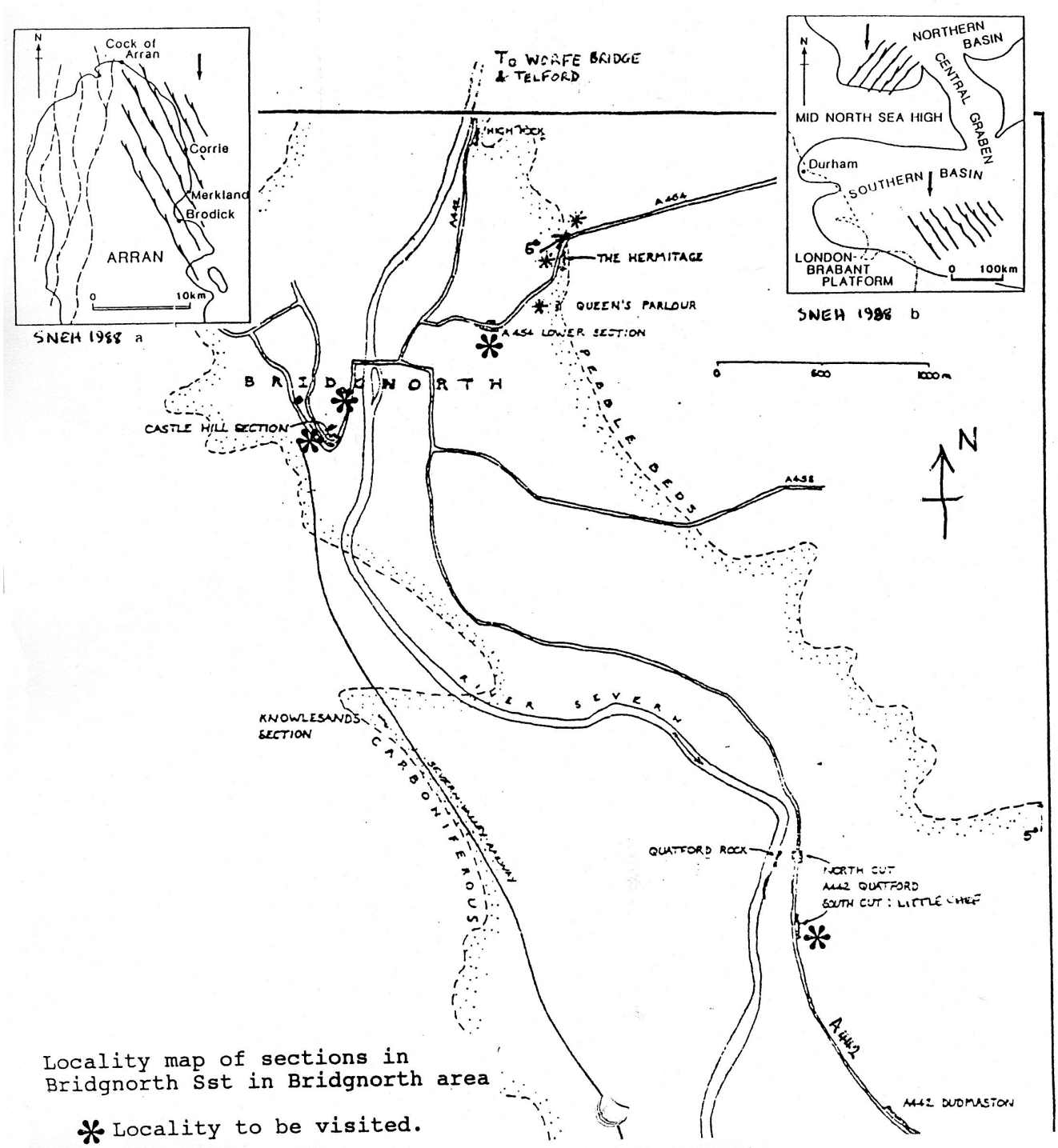

Figure 1: Locality map in the vicinity of Bridgnorth. The inset maps show the dunes in Arran (top left) and the North Sea (top right). [© David Thompson 1993]

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LOCALITY 2: Road cutting near Worfe Bridge, north of Bridgnorth [SO 727 953]

At the River Worfe near Bridgnorth the activities of mason bees demonstrate their ability to bore preferentially into dune foresets rather than into the slightly more densely packed grains of interdune beds – a useful pointer to distinguishing the two facies.

This locality, on the A442 near Worfe Bridge, can be used to work out the 3-dimensional geometry of pebble beds. North of the bridge on the west side of the road the fluvial Kidderminster Pebble Beds overlie the aeolian Bridgnorth Sandstone with significant erosional relief. This masks the likelihood that the surface marks an unconformity. South of the bridge on the eastern side of the road the same formations are juxtaposed. The group investigated the nature and origin of the junction/unconformity in both places.

The group was then invited to investigate the aeolian sandstones at the top of the Bridgnorth Sandstones in relation to the old hypothesis that the ?Permian winds were steady easterlies which formed transverse barchanoid ridge dunes (Shotton, 1937; 1956; Willis, 1950; 1956) or new hypotheses which suggest that the transverse and barchanoid draas bore superimposed oblique crescentic and linear dunes under the influence of a fluctuating east wind regime with northerly components (Karpeta, 1990) or that transverse, longitudinal (seif) and oblique elements are present (Sneh, 1988), again induced by a northerly subcomponent.

LOCALITY 3: Station Road, Bridgnorth [SO 714 927]

Here the lower part of the Bridgnorth Sandstone is a short distance above the equivalent of the Keele Sandstones (Upper Carboniferous). A single very large set of cross-bedding bears excellent grain-size differentiation with sandflow, ?sandfall and wind ripple or "pin-stripe" lamination being well seen. The set (part of a slip-faced draa) may be traced for 70 m parallel with the dip. Dip is not seen, but is about 5° to the east.

Lunch was then taken at Bridgnorth railway station on the Severn Valley Railway.

LOCALITY 4: Castle Hill, Bridgnorth [SO 717 928]

The east side of Castle Hill, in the gardens, exposes an extensive cliff section in the middle part of the Bridgnorth Sandstone Formation. The cliff trends north-south, normal to the east to west palaeowind. The sandstone shows large-scale trough cross-beds with sets between 5 and 10 m thick. Components of the foresets dipping to north and south can be seen in the caves which allow three-dimensional investigation. Are there any components which might be referred to oblique winds from the north or smaller dunes from the north migrating over degraded draa?

The group then drove southwards along the A442.

LOCALITY 5: Road cutting on the A442 at Quatford [SO 739 902]

The next exposure was in the road cutting on the A442 at Quatford, to the north of the Little Chef. This is a roadside section in the middle of the Bridgnorth Sandstone Formation where the rock faces are normal to the palaeowind. Crossbed sets are of a variety of scales and various levels of bounding surface are present.

This outcrop has been interpreted in terms of smaller dunes migrating over larger draa, perhaps at oblique angles (Steele, 1983), but there is plenty of opportunity for other ideas to be generated!

The group then drove back to Bridgnorth and took the Wolverhampton Road, turning right half way up the hill to park alongside the house fronts in the Lane from where they could walk back down the hill to the road cutting.

LOCALITY 6: Old Wolverhampton Road, Bridgnorth [SO 727 935]

Further aeolian sedimentary structures can be examined along the Old Wolverhampton Road leading east out of Bridgnorth, passing up into fluvial pebble beds.

Both the south and the north sides of the road expose one very large scale crossbed set over 20 m thick. Recall the structural dip of about 5° to the east. The group was invited to try to identify pinstripe wind-ripple lamination having up to 20° dip, grainfall laminae (possibly rare or absent) and grainflow (i.e. sand flow units) at higher angles

(23-35°). Is this a draa which was slip-faced or slip-faceless?

The group was asked how they would interpret the local third-order bounding surfaces with overlying smaller cross beds on the top of the large set on the north side of the road. From which direction did these dunes come; were they possibly oblique to the main east to west flow?

LOCALITY 7: Old Wolverhampton Road, Bridgnorth, continued

The group then walked northeastwards up the A454, past the lane where the cars were parked, to examine the roadcut which exposes the ?unconformable junction between the aeolian Bridgnorth Sandstone Formation below and the fluvial Kidderminster Conglomerate Formation above.

The group was invited to look for the sandstone units in the Kidderminster Conglomerate Formation and determine whether these are fluvial or aeolian.

The group was then invited to investigate the nature and origin of the Bridgnorth Sandstone Formation in relation to hypotheses already discussed.

LOCALITY 8: The Hermitage, Bridgnorth

The group then took the footpath on the south side of the road to conclude the day with a visit to "The Hermitage". Here curious ancient rock dwellings have been cut into the sandstone cliffs of Bridgnorth Sandstone Formation overlain by the fluvial Kidderminster Conglomerate Formation, and further east at the Queens Parlour. Although the walls have been etched with graffiti by more recent "primitives" such as "Lee" and "Kaz", this did not detract from the historical and geological interest of the site.

ACKNOWLEDGEMENTS

The leader, David Thompson, was affiliated with Keele University where he is a Senior Lecturer in Science Education.

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ISSN 1750-855x