SHROPSHIRE GEOLOGICAL SOCIETY

FIELD EXCURSION TO THE PRESTON BROCKHURST AND BRIDGNORTH AREAS TO INVESTIGATE THE KINNERTON-BRIGNORTH SANDSTONE FORMATIONS (?PERMIAN) AND THE OVERLYING CHESTER-KIDDERMINSTER CONGLOMERATE FORMATIONS (?LOWER TRIAS) IN THE CHESHIRE AND STAFFORD-WORCESTER BASINS SUNDAY 5TH SEPTEMBER 1993

Excursion leader: David Thompson (Senior Lecturer Science Education, Keele University)

The purpose of the field excursion is to investigate the various hypotheses offered recently in the literature concerning the nature and origin of the above ?Permian aeolian sandstone (180m thick) and ?Lower Triassic fluvial conglomerate (120m) formations in the two or three sedimentary basins which are found within the borders of Shropshire.

Meeting point: Rockhall Road Cutting on the B5063 immediately south of Besford Wood near Preston Brockhurst SJ541 523.

Our route will cover the following localities; all but the first marked on Fig.1.

1. **The Rockhall Road Cutting SJ 541 523.** The top of the Kinnerton Sandstone is well exposed in this potential SSSI or RIGS site 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).

   Trace fossils, ?plant stem casts **Dikika** or ?arthropod ?burrows, are present in the flat bedded sandstone.
   References Steele 1982, 1983.

2. **Travel via Shrewsbury and Telford to the Road Cutting on the A442 near Worfe Bridge, north of Bridgnorth (SO 727 953).** 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. Investigate the nature and origin of the junction/unconformity in both places.

   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 tha 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.

3. **Station Road, Bridgnorth (SO 714 927).** The lower part of the Bridgnorth Sandstones 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 pin-stripe ripple lamination being well seen. The set (part of a slip-faced draa) may be tracaed for 70m parallel with the dip. Dip is not seen, but is .5 degrees to the east.

4 **The east side of Castle Hill, Bridgnorth (SO 717 928), in the gardens.** 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 10m 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? Drive southwards along the A442.

5. **Road Cutting on the A442 at Quatford (SO 739 902) 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! Drive back to Bridgnorth and take the Wolverhampton Road. Turning right half way up the hill to park alongside the house fronts in .... Lane. Walk down the hill to the road cutting.

6. **Road cutting on the A454 east of Brignorth SO 727 935.** The south and north sides of the road expose one very large scale crossbed set over 20m thick. Recall the structural dip of c. 5 degrees to the east. Try to identify pinstripe wind-ripple lamination up to 20° dip, grainfall lamina (possibly rare or absent) and grainflow (= sand flow units) at higher angles (23-35°). Is this a draa which was slip-faced or slip-faceless? How do you 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?

7. Walk northeastwards up **the A454**, past the lane where the cars are parked, and examine **the roadcut** which exposes the ?unconformable junction between the aeolian Bridgnorth Sandstone Formation below and the fluvial Kidderminster Conglomerate Formation above. Look for the sandstone units in the KCF and determine whether these are fluvial or aeolian. Investigate the nature and origin of the BSF in relation to hypotheses already discussed.

8. If time permits, take the footpath on the south side of the road in order to examine the BSF and the KCF at **the Hermitage**, where there are remnants of many former rock houses, **and** further east at **the Queens Parlour** .

References

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4. Shotton, F.W. 1956 Some aspects of the New Red Desert in Britain. Liverpool and Manchester Geological Journal 1, 450-465.

5. Sneh, A. 1988 Permian dune patterns in northwestern Europe challenged. Journal of Sedimentary Petrology 58, 44-51.

6. Steele, R. P. 1982 Unpublished PhD thesis. University of Durham.

7. Steele, R.P. 1983 Longitudional draa in the Permian Yellow Sand of north-east England. In: Eolian sediments and Processes (Ed. by M.E.Brookfield and T.S.Ahlbrandt) 543-550. Developments in Sedimentology 38, Elsevier, Amsterdam.

8. Wills, L.J. 1950 The palaeogeography of the Midlands. Liverpool, Unversity Press, 147pp.

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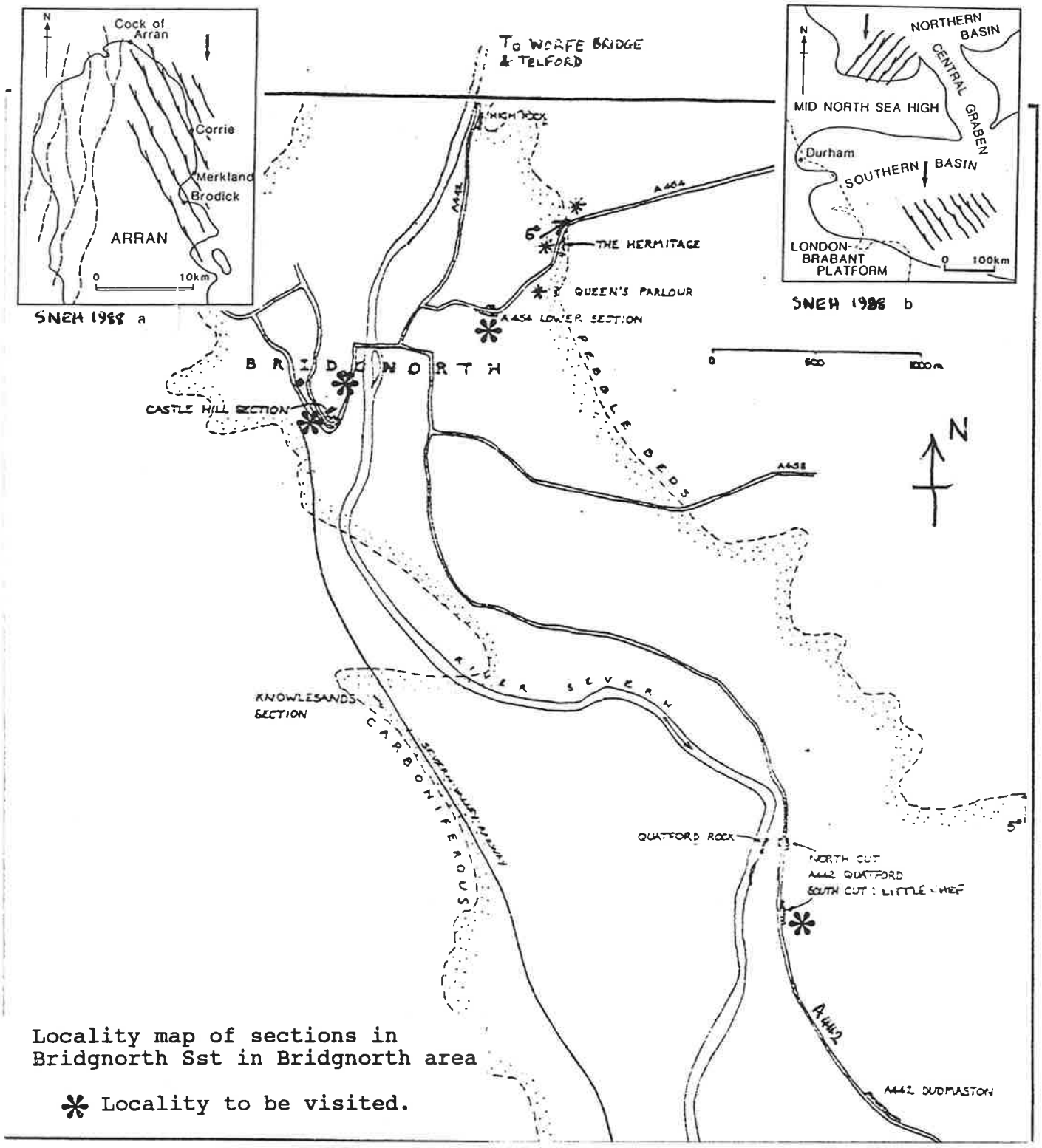

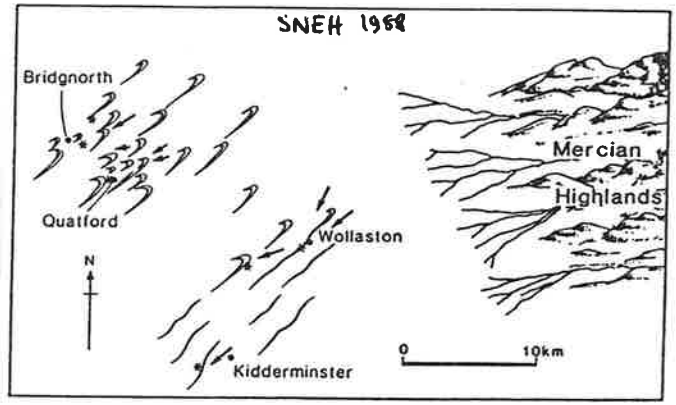

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FIG. 6.—Paleogeographical sketch maps showing dune patterns and prevailing wind directions (arrows). a) Isle of Arran (dashed line = stream). b) North Sea basins (data after Glennie 1983a). c) The Midlands (highland and fans after Wills 1950; asterisk = site studied).

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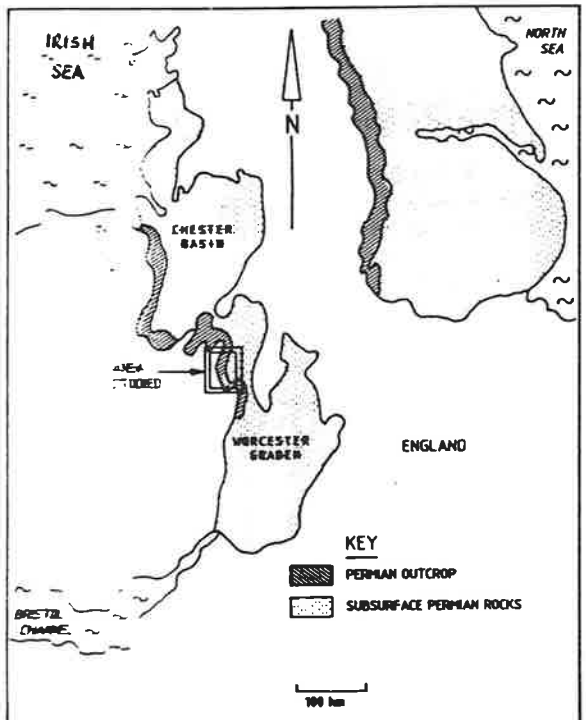


Fig. 1. Locality Map of the Bridgnorth area, Shropshire, England.

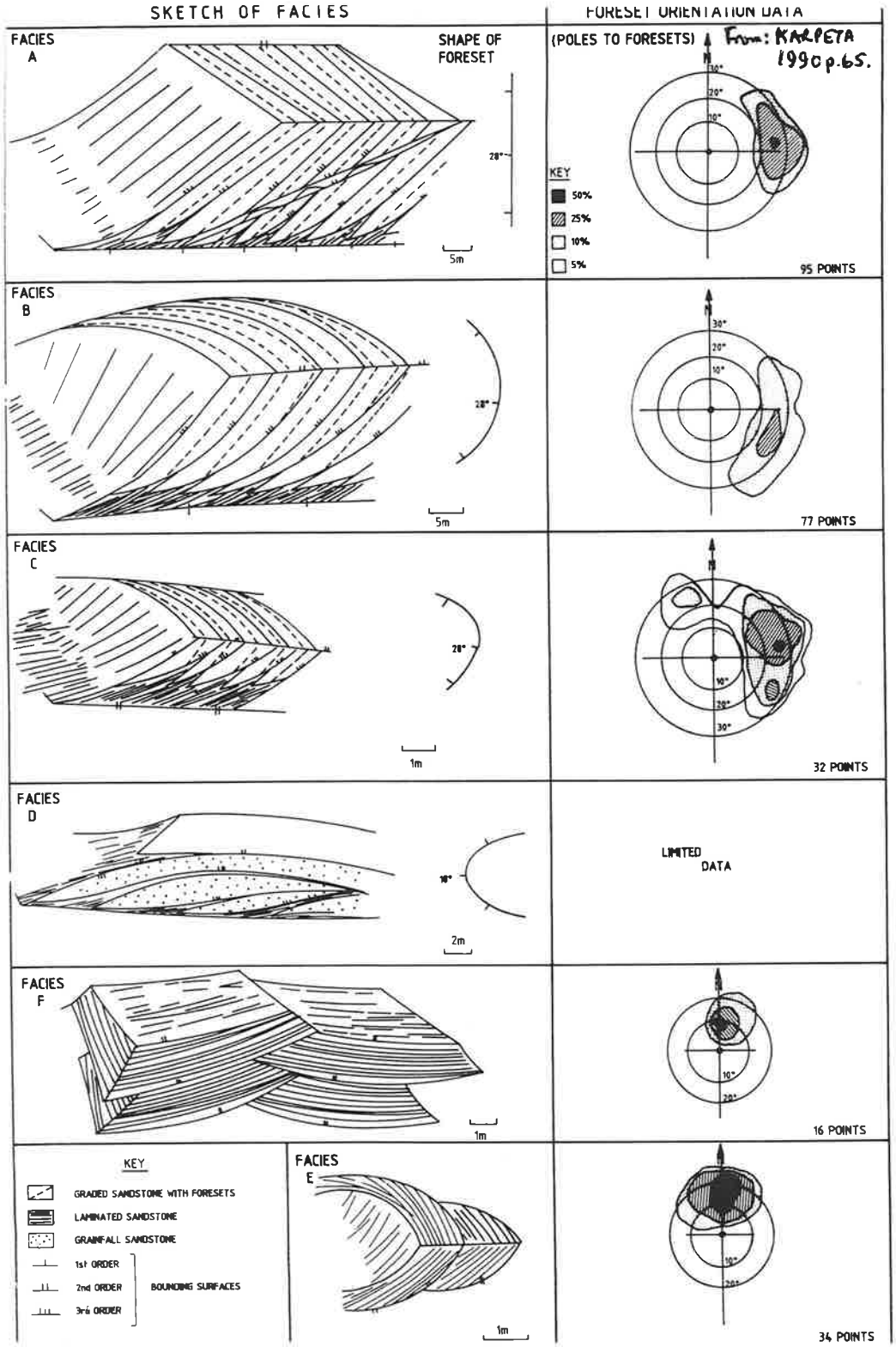


Fig. 4. Schematic diagrams of Facies identified in the Bridgnorth Sandstone Formation, Bridgnorth, showing facies geometry foreset orientation.

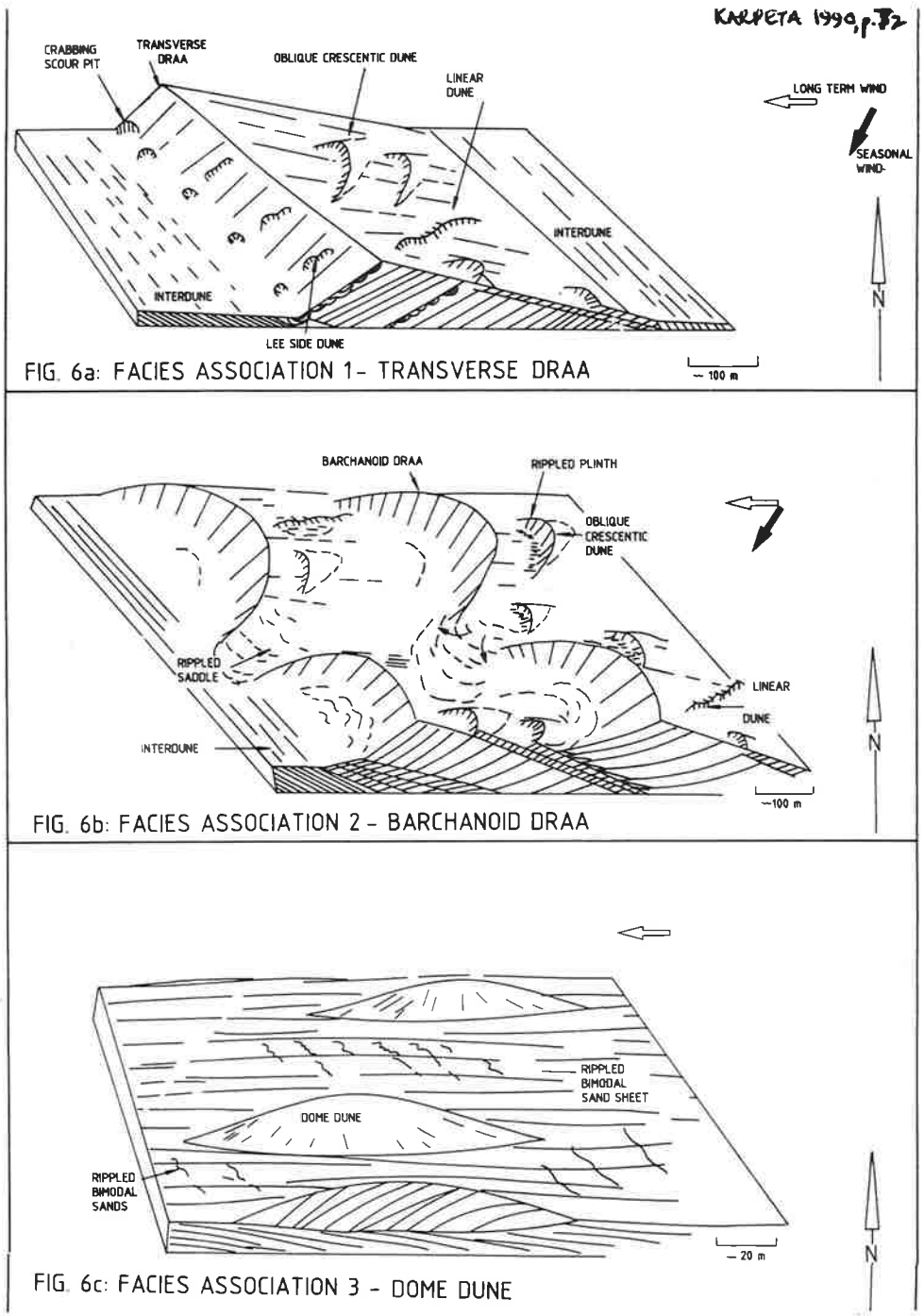


Fig. 6. Facies associations in the Bridgnorth Sandstone Formation, Bridgnorth.

TABLE 1

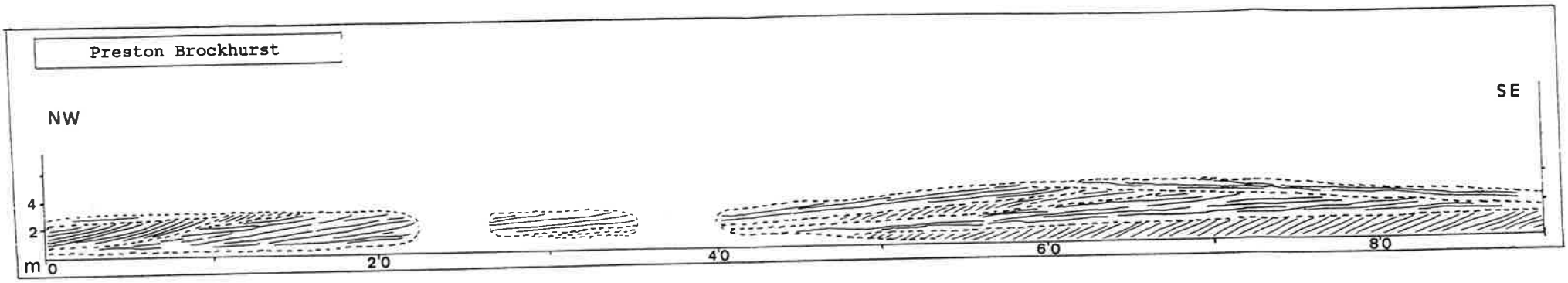
Stratification types in the Bridgnorth Sandstone Formation

Lamina shape	Lamina thickness	Sediment structure	Grain size	Sorting	Base	Occurrence	Interpretation
Graded sandstone							
Tabular to lobate, thin down foresets	up to 10 cm thick	massive, graded; slumped occ. breccia	coarsen or fine up	well sorted unimodal	sharp erosional	foresets dipping 24° to 30°	sandflow down dune slipface
Diffusely laminated sandstone							
Discontinuous laminae thin down foresets	up to 5 mm	thin graded laminae	fine up	well sorted	sharp, non-erosive base	foresets dipping 10° to 30°	grainfall–sand fallout on dune lee
Well laminated sandstone							
Continuous laminae thin up foresets; wedges	up to 1 cm thick	reverse graded; adhesion warts and ripples	coarsen upward, bimodal	moderately well sorted bimodal	sharp, erosive base	toes of foresets, scours, plinths	subcritically climbing ripples
Wavy laminated, ripple cross-laminated sandstone							
Lenticular laminae	up to 3 cm	laminated; ripple cross-laminated, lags	coarsen upward	moderately sorted bimodal	sharp, erosive base	separate lenses	rippled and deflated sand sheets

TABLE 2

Bridgnorth Sandstone Formation facies

Geometry	Foreset variance	Dimensions	Lower bounding surface	Foreset dip	Internal bounding surface	Stratification types	Interpre ation
Facies A							
Large, tabular planar cross-stratification	small spread (15°)	up to 20 m thick, 100 m across	planar, flat to slightly climbing	planar, 25–30°	planar	graded laminated	transver e dunes/ draas
Facies B							
Large, scoop-shaped, wedge planar cross-stratification	wide spread (90°)	up to 20 m thick, 60 m across	scoop shaped	planar to concave up, 25–30°	scoop shaped, concave up	graded laminated.	barchanoid ridges/ draas
Facies C							
Small, scoop-shaped, wedge planar cross-stratification	wide spread (90°)	up to 3 m thick, 20 m across	scoop shaped, climbing	concave up, 25–30°	scoop shaped, concave up	graded laminated	smaller oblique crescentic dunes
Facies D							
Large, convex up, wedge planar cross-stratification	wide spread (90°)	up to 6 m thick, 20 m across	planar, flat to slightly descending	convex up, 10–25°	convex up, curved downdip	diffuse graded	dome dunes(?)
Facies E							
Small, irregular scoops, laminated cross-stratification	highly variable	up to 3 m thick, 10 m across	deep, scoop shaped, hollows	concave up, 10–30°	scoop shaped concave up	almost entirely laminated	crabbing scour pits
Facies F							
Curved to flat lenticular units	small spread	up to 3 m thick, 30 m across	shallow, concave up, curved	foresets not developed	shallow, scoop shaped	almost entirely laminated	linear dunes(?) plinths
Facies G							
Lenticular units	foresets not developed	up to 3 m thick, 20 m across	generally flat	foresets not developed	shallow planar	bimodal laminated sands	interdune/interdraa surfaces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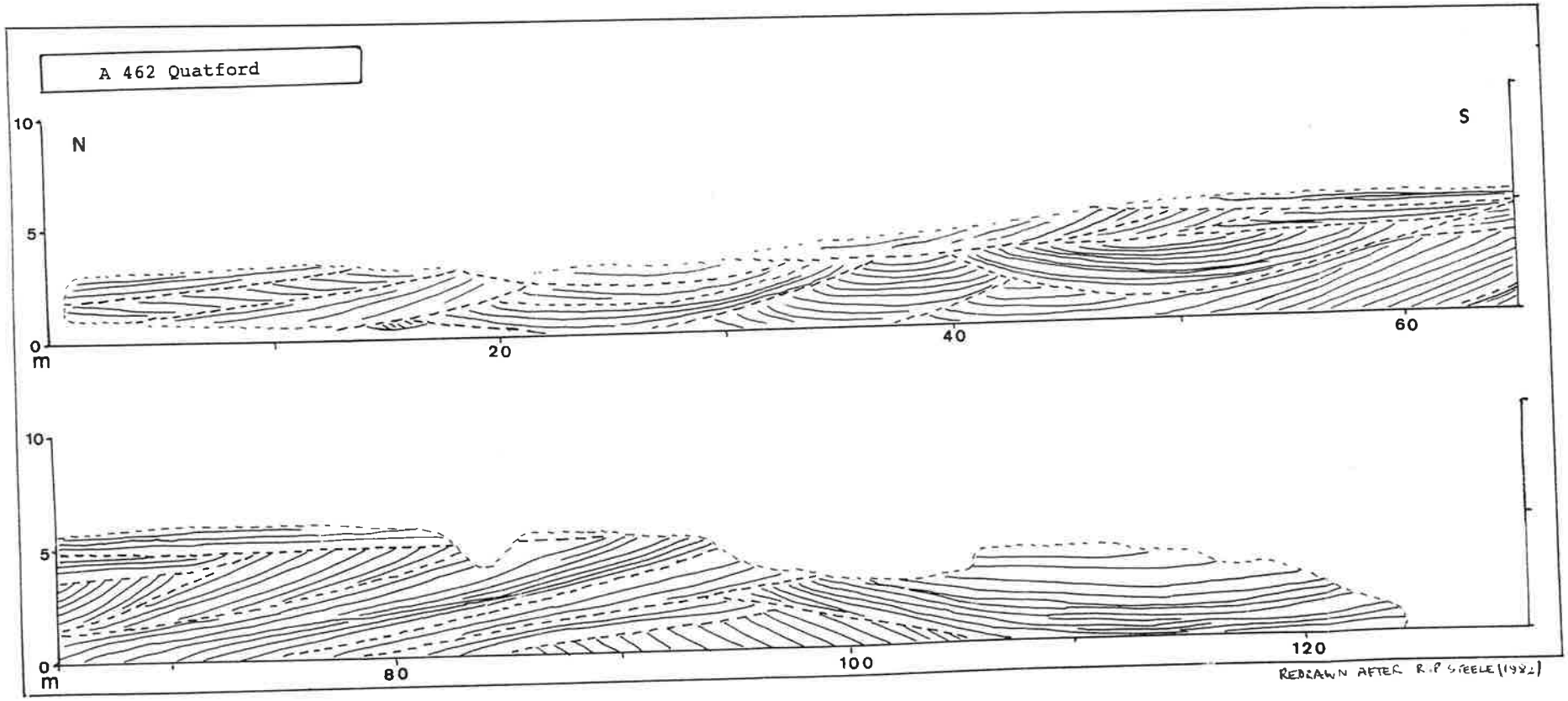
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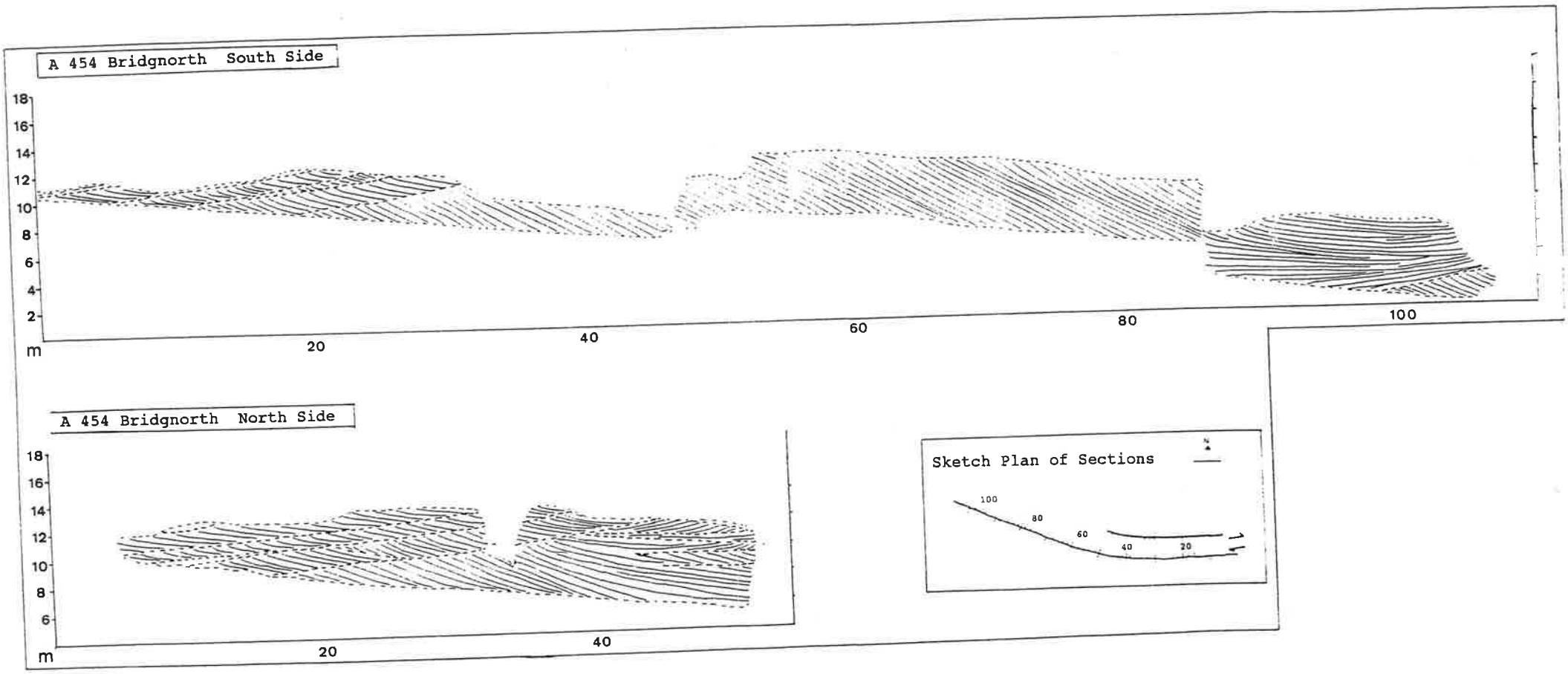
REDRAWN AFTER R.P STEELE (1982)


A 454 Bridgnorth South Side
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A 454 Bridgnorth North Side
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