THE STRATIGRAPHY AND SEDIMENTOLOGY OF THE SKIPTON MOOR GRITS (NAMURIAN E_{1C}) AND THEIR LATERAL EQUIVALENTS.

John G. Baines

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PHOTO I.

Bow shaped linguoid ripples on facies 6, Thin turbidite sandstone. Current flow direction towards observer. Geological hammer on right hand side for scale. (Note: in this and subsequent photographs where the hammer is used as a scale, the total length of the hammer is 33cm, the rubber handle is 19cm long and the metal pick is 17cm wide).

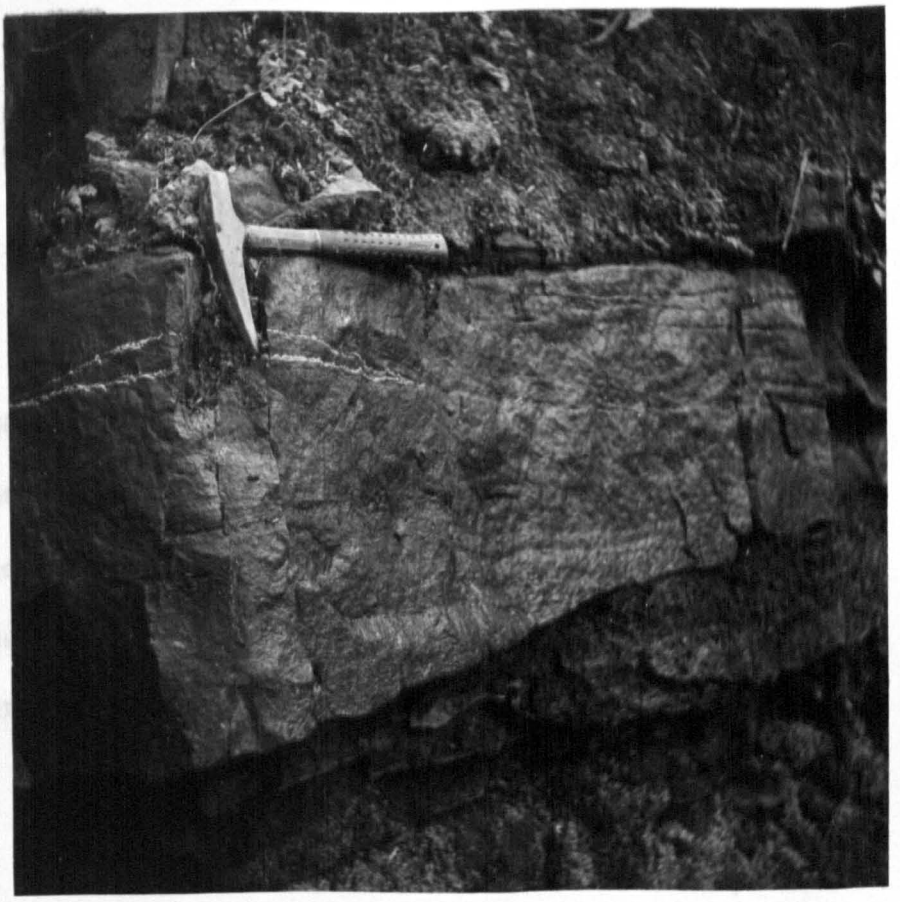
Slope Association. Lower part of Howgill Sike (SE09225310) near confluence with Kex Beck, Deerstones.

PHOTO 2.

Dune bedding in facies 6, Thin turbidite sandstone. Low angle foresets dip gently into the photograph giving an apparent dip towards the right. The chalk mark just below the hammer pick highlights an amalgamation surface (see Fig. 8B), Turbidite Association. Catlow Gill (SD97704887) near Glen Cottage, Carleton.

PHOTO 3.

Prod, skip and brush marks on the sole of a facies 6, Thin turbidite sandstone. Current direction from right to left. Horizontal width @ 26cm. Turbidite Association. Specimen 69. Rushy Gill (SD951491), Carleton.



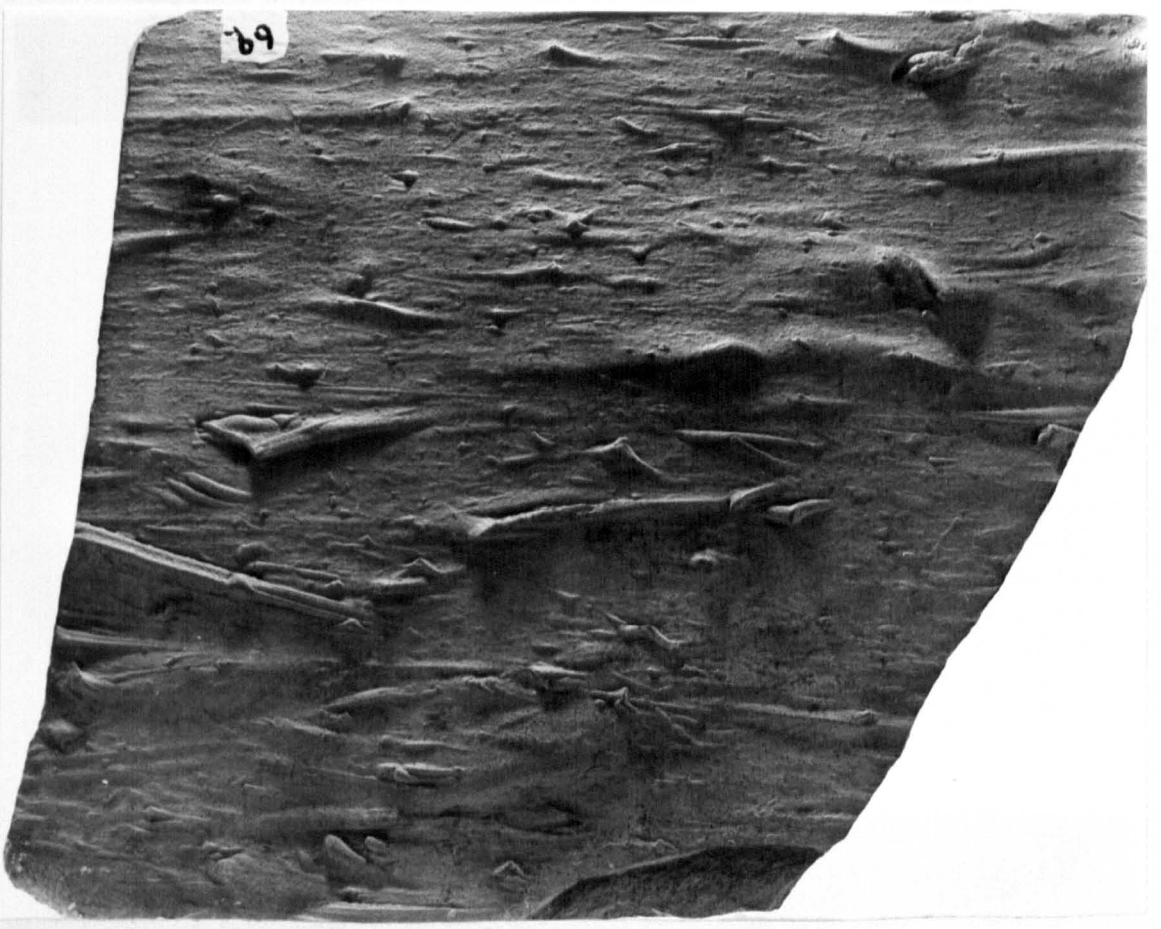

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PHOTO 4.

Detail of brush and prod marks seen in Photo 3.

Facies 6, Thin turbidite sandstone. Turbidite

Association. Specimen 69. Rushy Gill (SD951491),

Carleton.

PHOTO 5.

Groove moulds, showing at least three directions,

on the sole of a facies 6, Thin turbidite sandstone.

Current flow from top to bottom.Turbidite Association.

Specimen 86. Cawder Gill (SE001502), Skipton Moor.


MM
1
2
3
4

PHOTO 6.

Groove mould on the sole of a facies 6, Thin turbidite sandstone. Four centimetre scale card at top of specimen.

Note positive hyporelief branching burrow on right hand side, identified as Palaeophycus (see Photo 93).

Specimen 156. Catlow Gill (SD968495), Carleton.

PHOTO 7.

(Bottom left)

Chevron mark on the sole of a facies 6, Thin turbidite sandstone. The v's point downstream, i.e.:- the current direction is from bottom to top in this photograph.

Specimen 167. Bareshaw Beck (SD981484), Carleton.

PHOTO 8.

(Bottom right)

Sole of facies 6, Thin turbidite sandstone showing long chevron mark (detail in Photo 7) and positive hyporelief burrow (arrowed) identified as Protopalaeodictyon (see Photo 97 and Fig. 62 for details). Specimen 167. Bareshaw Beck (SD981484), Carleton.

PHOTO 9.

Flute moulds on the sole of a facies 6, Thin turbidite sandstone. Current direction from top to bottom. Turbidite Association. Specimen 134. Bareshaw Sike (SD983485), Carleton.

PHOTO 10.

Crescent scours on the sole of a facies 6, Thin turbidite sandstone. The current crescent was formed on the down-current side of an obstruction (probably in this case a protruding stalk of a vertical burrow - see also Photo 115). Current flow direction from left to right.


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PHOTO 11.

Longitudinal ridges on the sole of a facies 6, Thin turbidite sandstone. Horizontal width of specimen @ 15cm. Turbidite Association.

Specimen 28. Gas Pipeline Trench (SE01055114). Skipton Moor.

PHOTO 12.

Prod mark on the sole of a facies 6, Thin turbidite sandstone. The object that caused the mark was rotated on impact. Current flow from right to left. Turbidite Association.

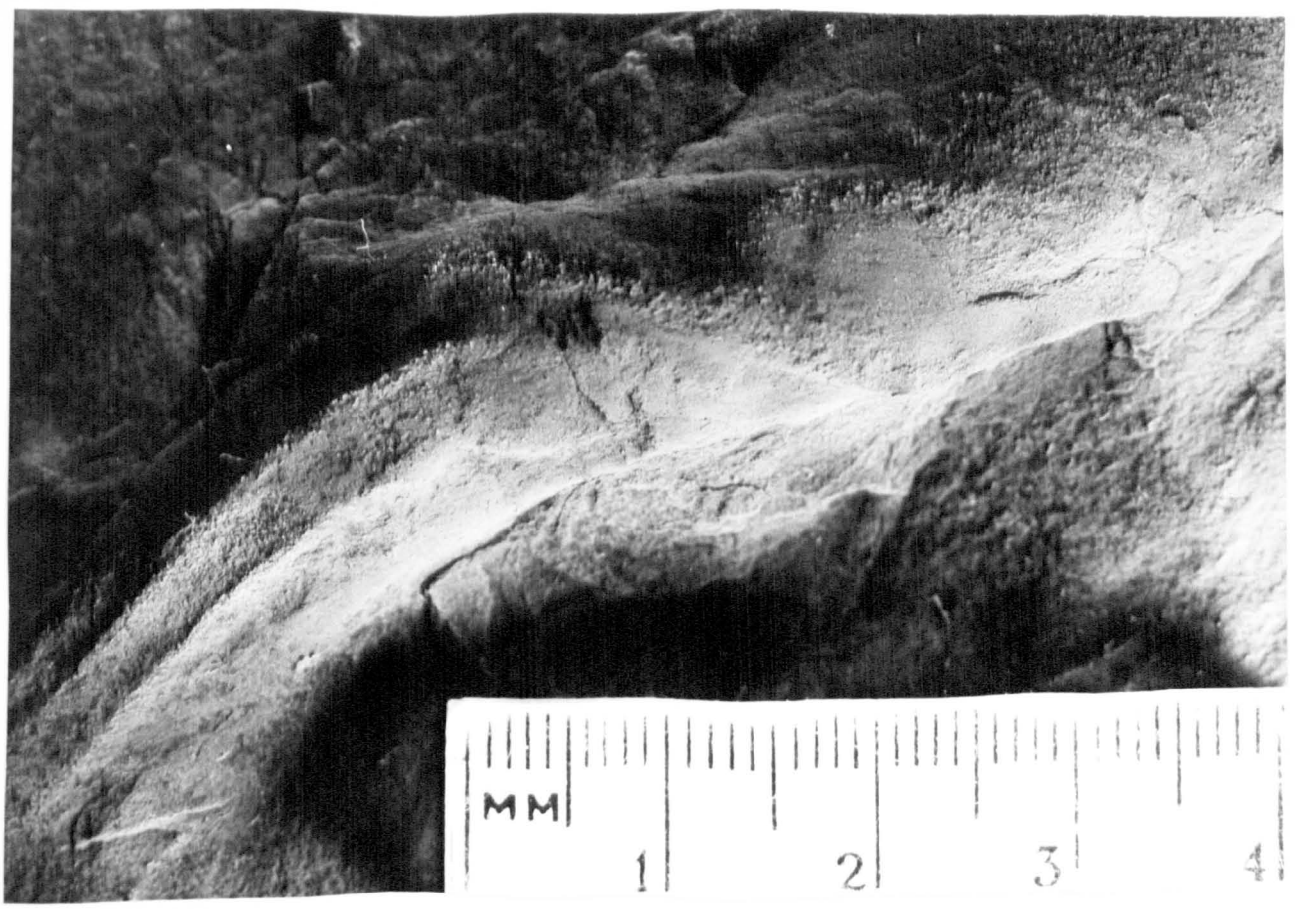
MM
1
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PHOTO 13.

Fleur-de-lys pattern on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 80, Carla Beck (SD97764890), Carleton.

PHOTO 14.

Splitting plane surface of a facies 6, Thin turbidite sandstone, showing the concentration and crude orientation of carbonaceous debris. Turbidite Association, Specimen 159. Catlow Gill (SD96124906), Carleton.


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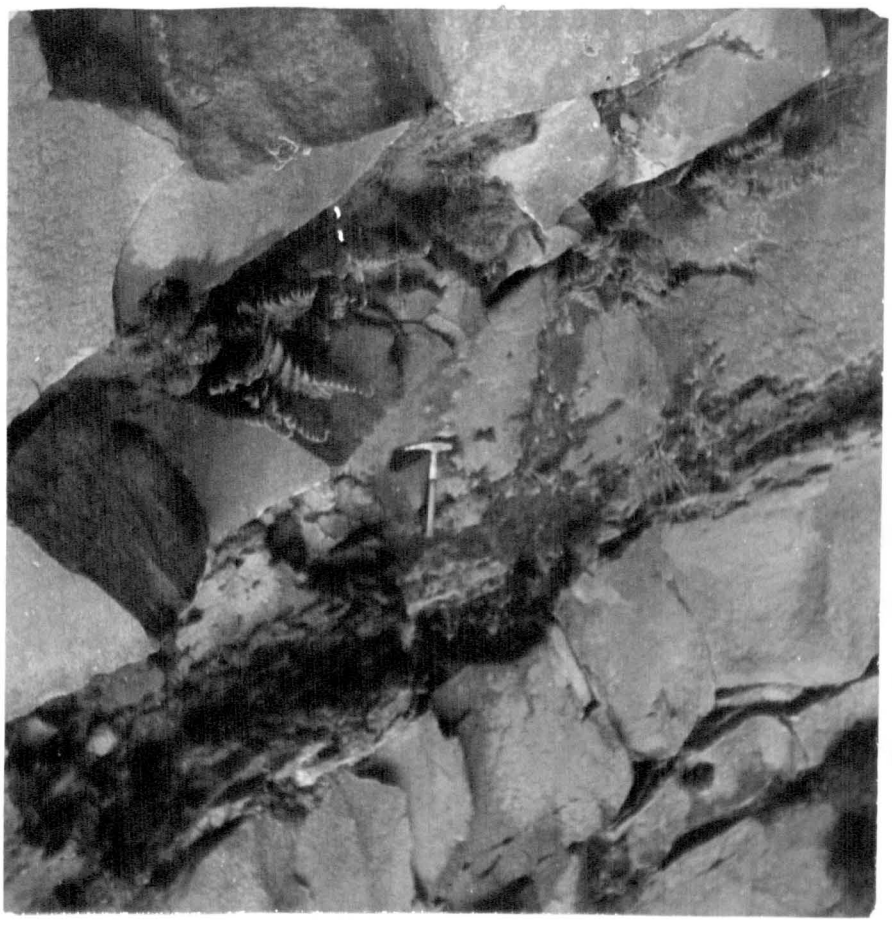
PHOTO 15.

Detail of facies 7, Composite sandstone showing local scour and fill structure. Hammer handle for scale. Turbidite Association. Witshaw Bank Quarry (SE00165484), Embsay.

PHOTO 16.

Section of facies 7, Composite sandstone showing the massive ungraded nature of these beds. Hammer (centre) is resting in the impression of a weathered-out mudstone or siltstone clast. Turbidite Association. Witshaw Bank Quarry (SE00165484), Embsay.



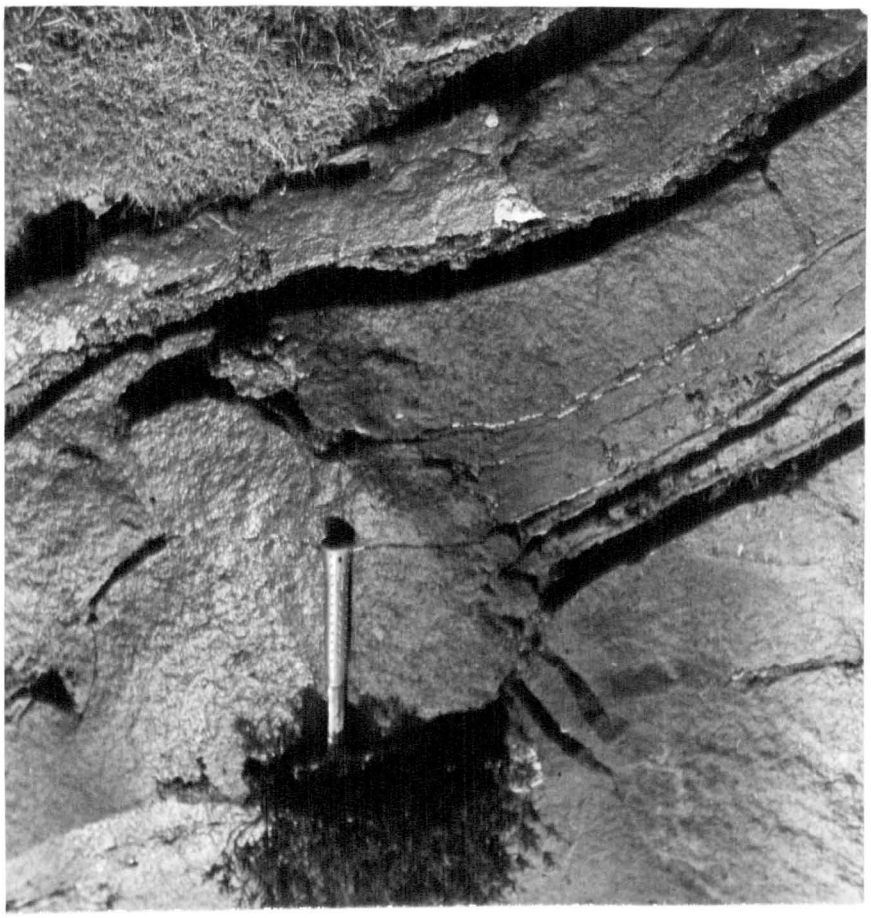


PHOTO 17.

Vertical sheet dewatering structures in facies 7, Composite sandstones. The amalgamated base to bed is seen at the bottom of the picture. Thin vertical tubes coalesce at regular intervals becoming gradually thicker upwards. Hammer (left) for scale. Packhorse bridge (SE08975294), Deerstones, Kex Beck.

PHOTO 18.

Close up detail of sheet dewatering structures. Rubber handle of hammer (far left) for scale. Packhorse Bridge (SE08975294), Deerstones, Kex Beck.

PHOTO 19.

Close up detail of sheet dewatering structure in facies 7, Composite sandstone. Note the formation of horizontal ribs at the top of the structure. The origin of these is uncertain. Packhorse Bridge (SE08975294), Deerstones, Kex Beck.

PHOTO 20.

(Bottom left)

Specimen of sheet dewatering structure collected from Deerstones, (SE08975294), Kex Beck. Specimen 170.

PHOTO 21.

(Bottom right)

Specimen viewed from above showing the penetrative nature of the elutriation columns. Specimen 170.

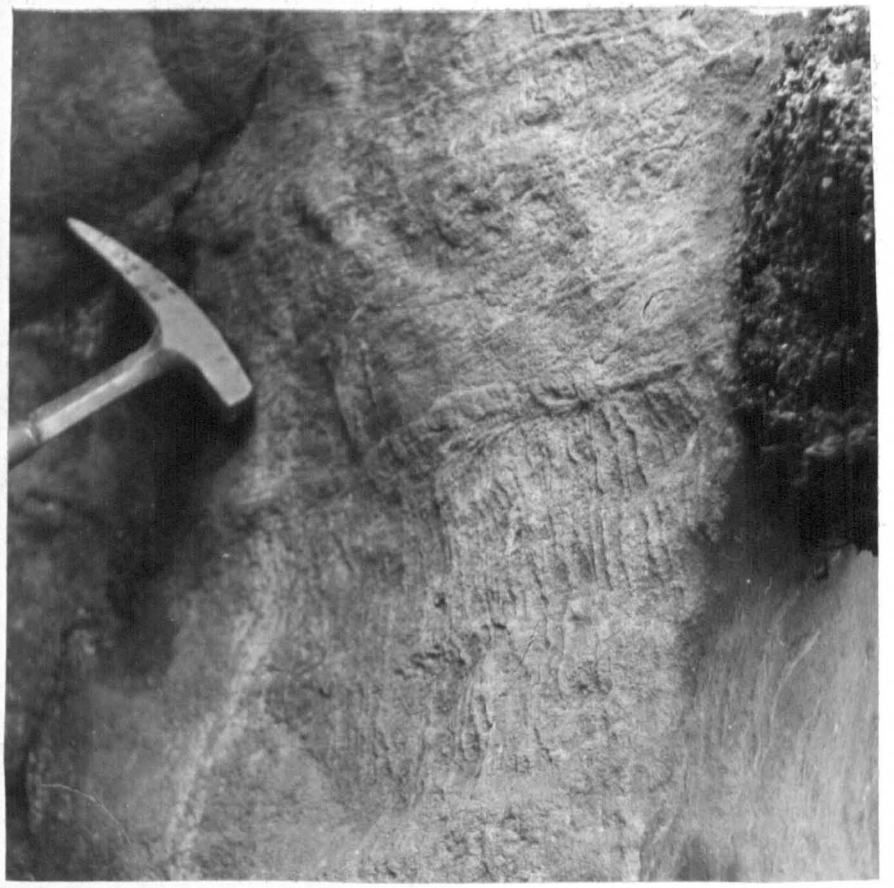
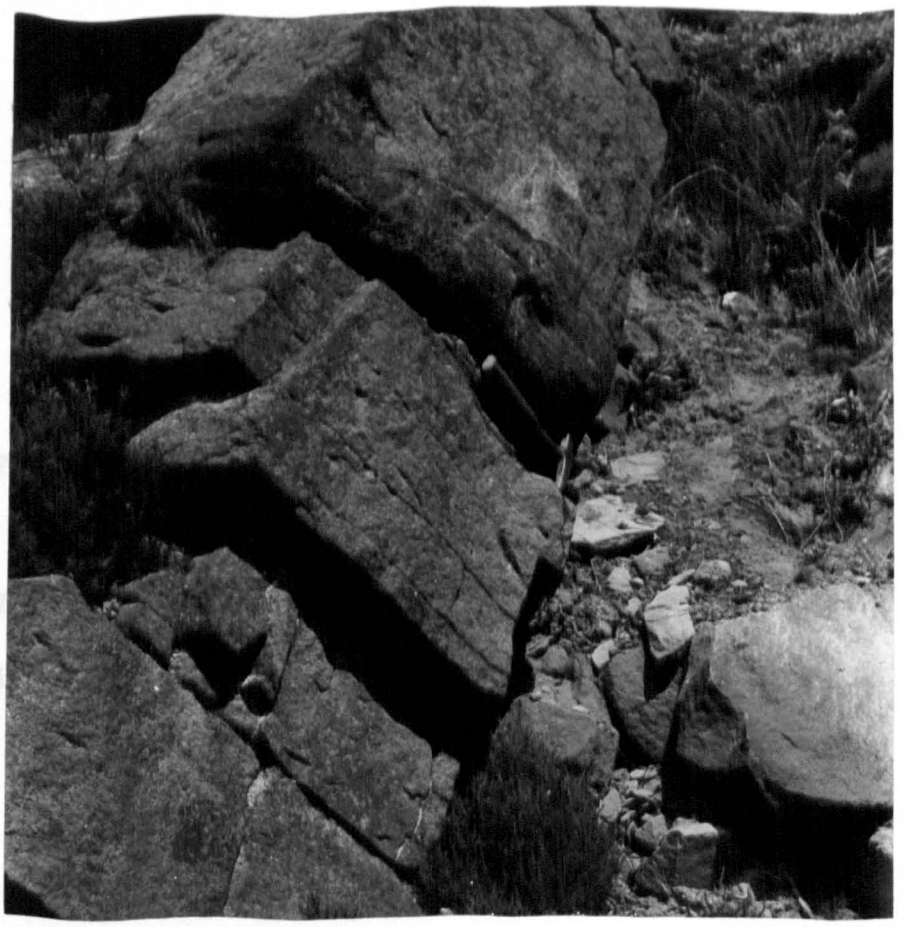


PHOTO 22.

Facies 8, Parallel bedded sandstone. Waterfall Gill (SD98545678), Hammer (centre) for scale. Slope Association.

PHOTO 23.

Facies 9, Ropy weathering sandstone. Vicar's Allotments, (SE00775103) Skipton Moor. Lens cap (top left) is 7cm Long. Turbidite Association.



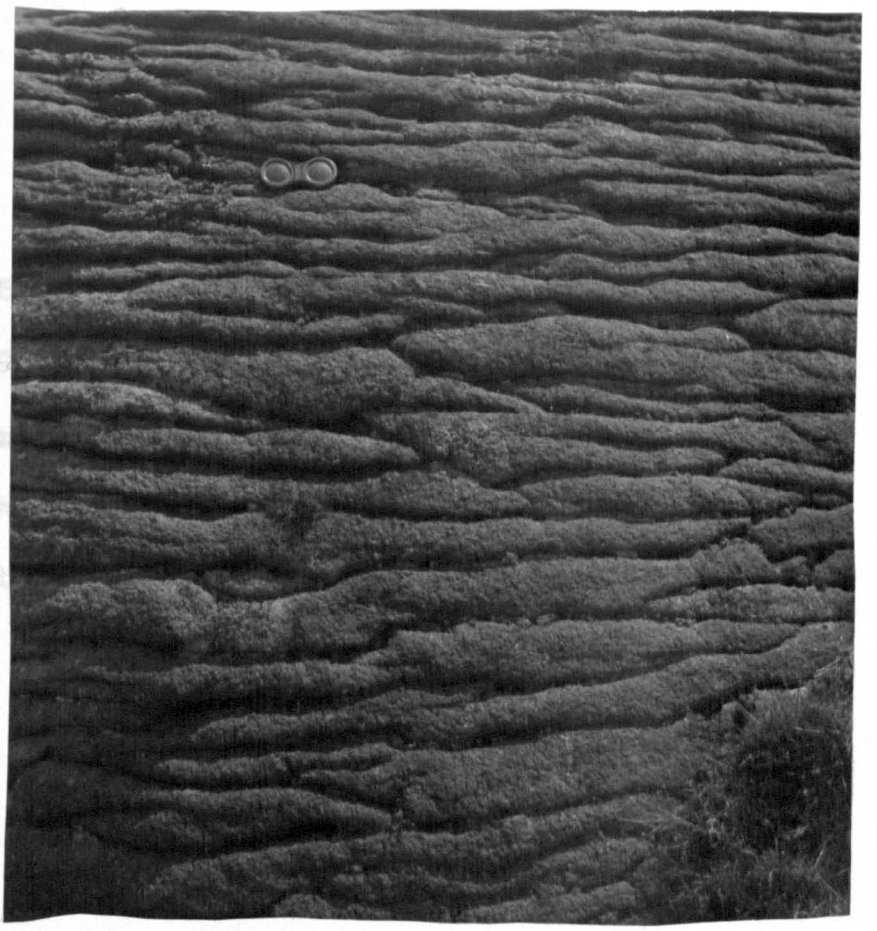


PHOTO 24.

Facies 9, Ropy weathering sandstone. Vicar's Allotments, (SE00775103) Skipton Moor. Pencil (centre) is 16cm long. Turbidite Association.

PHOTO 25.

Facies 9, Ropy weathering sandstones. Note undulating amalgamations. Low Snaygill Farm (SD99464982) Skipton. Hammer handle (bottom centre) is 35cm long. Turbidite Association.

PHOTO 26.

Apparent cross-bedding (arrowed) in facies 9, Ropy weathering sandstone. Vicar's Allotments (SE00715074) Skipton Moor. Pencil (top centre) is 12cm long. Turbidite Association.

PHOTO 27.

Flow roll preserved in facies 9, Ropy weathering sandstone. Butler Hill (SD98234904) Carleton. Hammer (centre right) for scale. Turbidite Association.

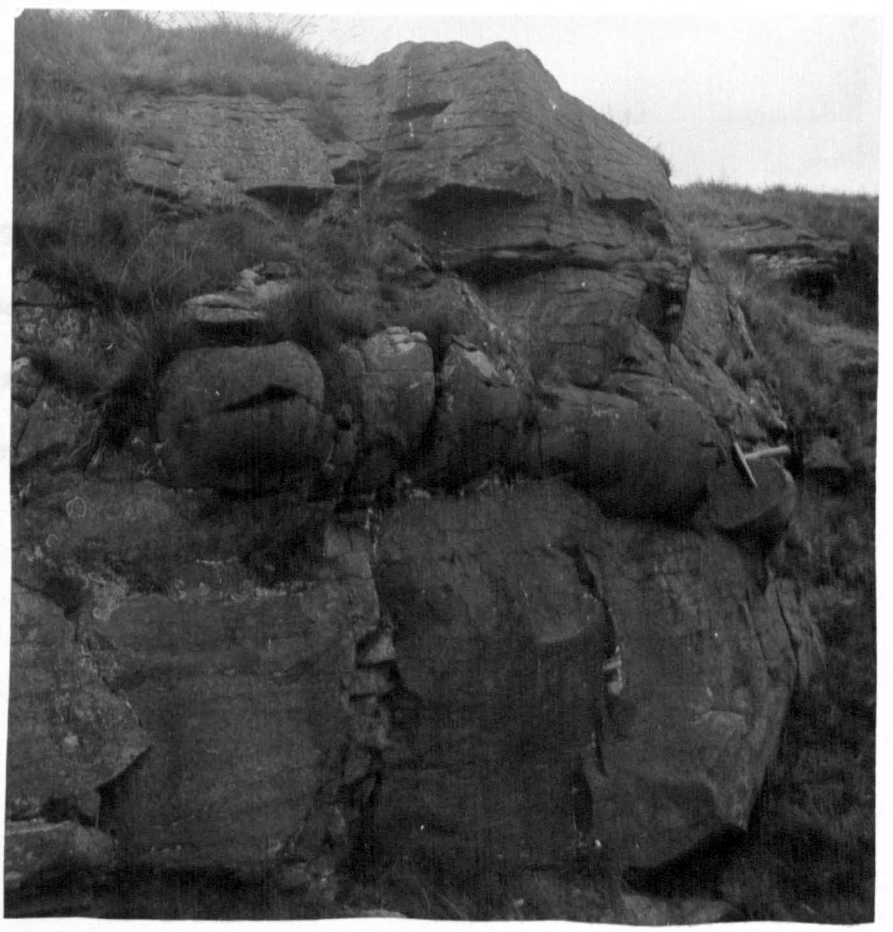


PHOTO 28.

Top view of facies 10, Medium scale cross-bedded sandstone. Current flow from bottom left to top right. Little Crag (SE1025330) Beamsley Moor. Hammer for scale. Delta Top Association.

PHOTO 29.

Top view of cosets of facies 10, Medium scale cross-bedded sandstone. Gill Beck Head (SE02175974), Burnsall and Thorpe Fell. Delta Top Association.

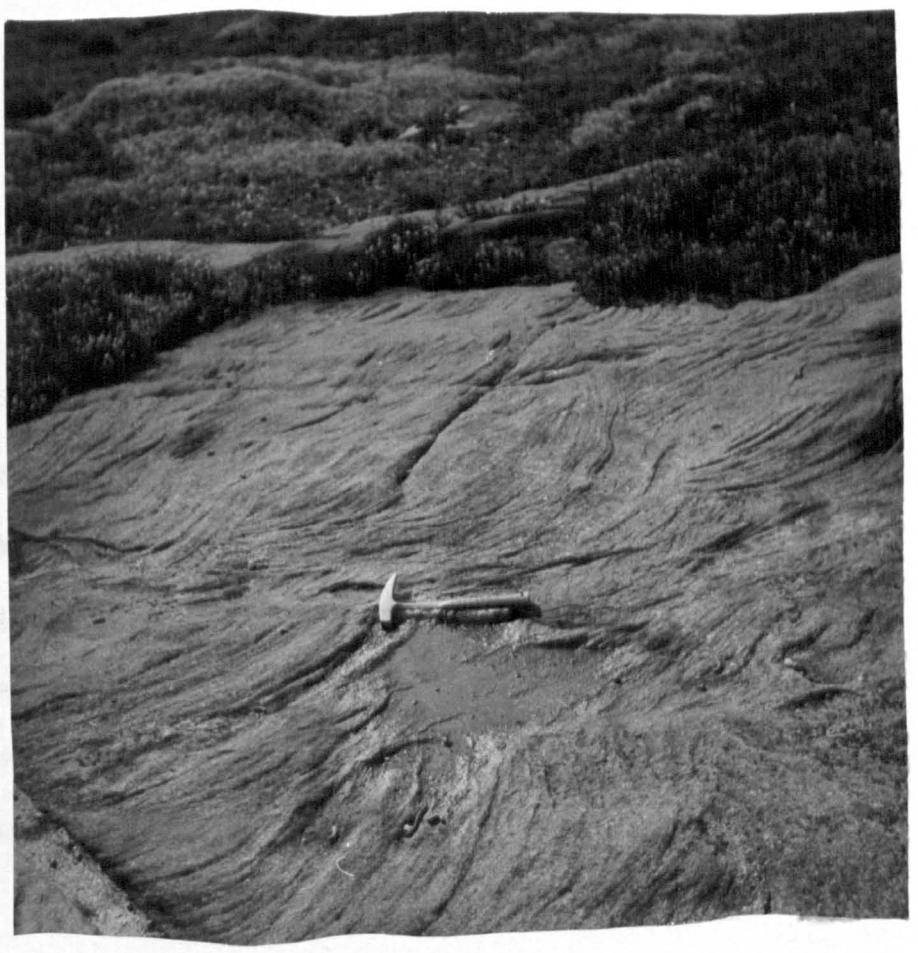


PHOTO 30.

Side view of a large scale dewatering structure in facies 10, Medium scale cross-bedded sandstone. Deer Gallows Ridge (SD999556), Embsay Moor. Delta Top Association.

PHOTO 31.

Side view of cosets of facies 10, Medium scale cross-bedded sandstones. Note the scoop shaped lower bounding surface and the tangential foresets. Gill Beck Head (SE02175974), Burnsall and Thorpe Fell. Hammer head (bottom right) for scale. Delta Top Association.

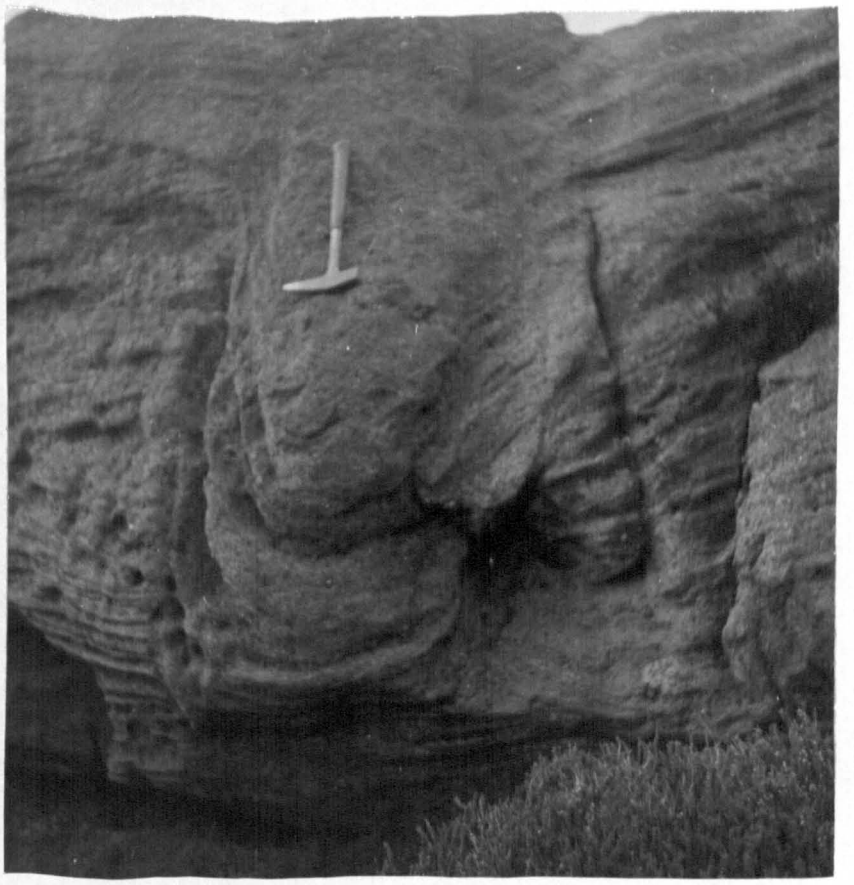


PHOTO 32.

Top view of the concentric rings of a dewatering structure in facies 10, Medium scale cross-bedded sandstones. Greystones (SE09935308), Langbar Moor. Delta Top Association.

PHOTO 33.

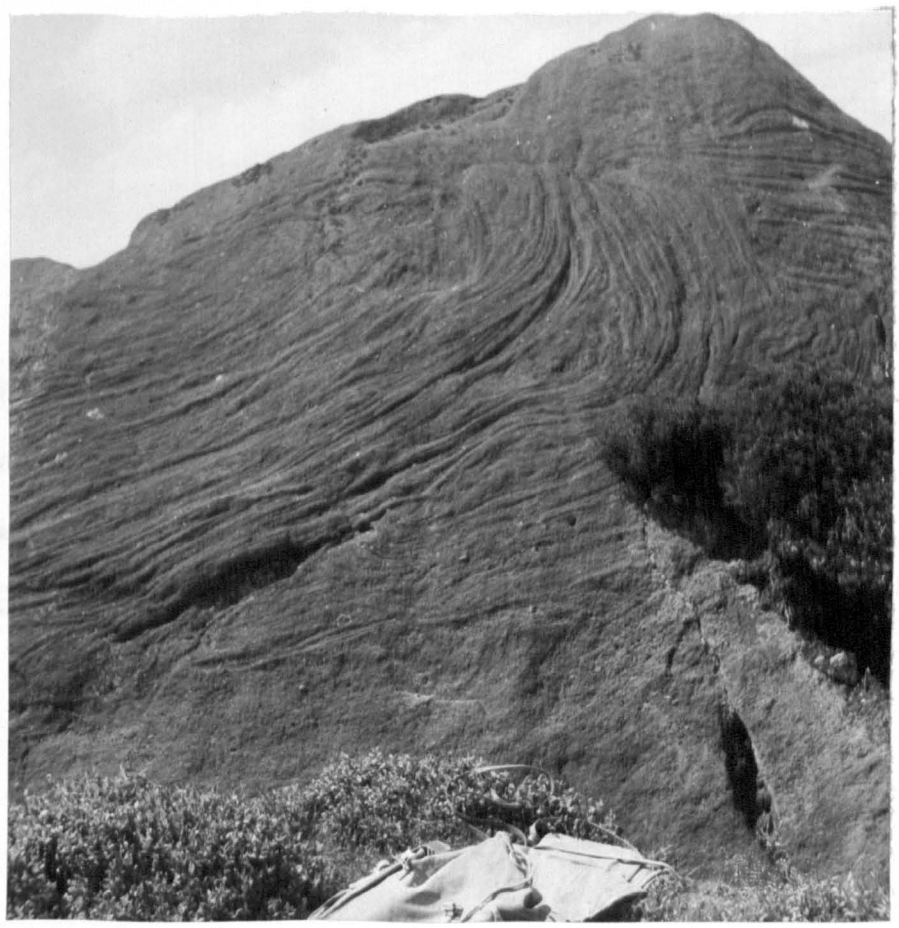
Top view of a circular dewatering "volcano" in facies 10, Medium scale cross-bedded sandstones. Newlands Farm, Sour Bank (SE01294800), Bradley. Delta Top Association.

PHOTO 34.

Non-truncating upward dewatering structure in facies 10, Medium scale cross-bedded sandstone. Fairies Chest, Crookrise Crag Top (SD98685615), Rylstone Fell. Delta Top Association.

PHOTO 35.

Dewatering structure in facies 10, Medium scale cross-bedded sandstone. Hellifield Crag (SD98425659), Rylstone Fell. Hammer (top centre) for scale. Delta Top Association.



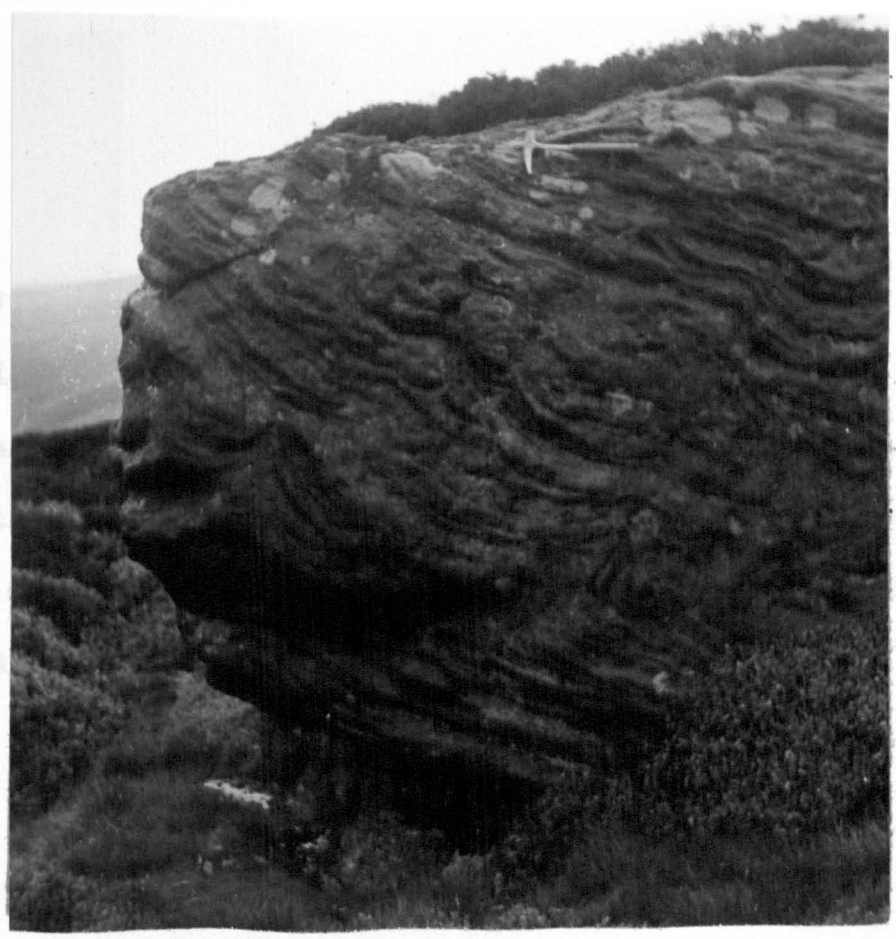
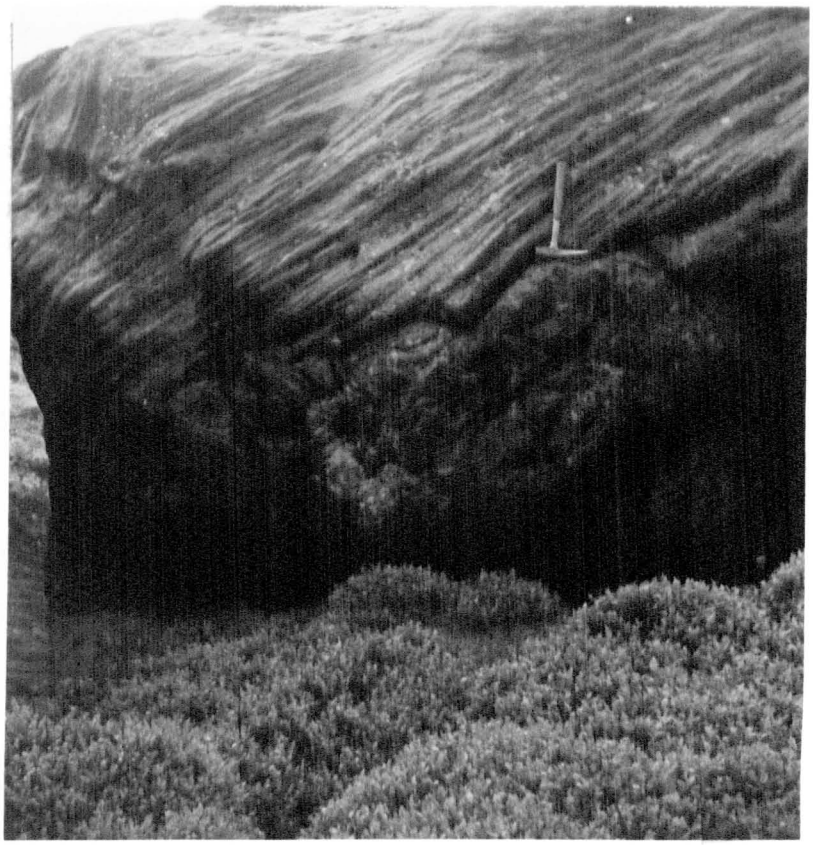


PHOTO 36.

Dewatering structure in facies 10, Medium scale cross-bedded sandstone. Hellifield Crag (SD98425659), Rylstone Fell. Delta Top Association..

PHOTO 37.

Facies 11, Large scale cross-bedded sandstone (Type A). Note that the upper surface of the large scale foresets is truncated by a horizontal planar erosion surface. The man is sitting on facies 10, Medium scale cross-beds. Rolling Gate Crag (SE00036010), Cracoe Fell.



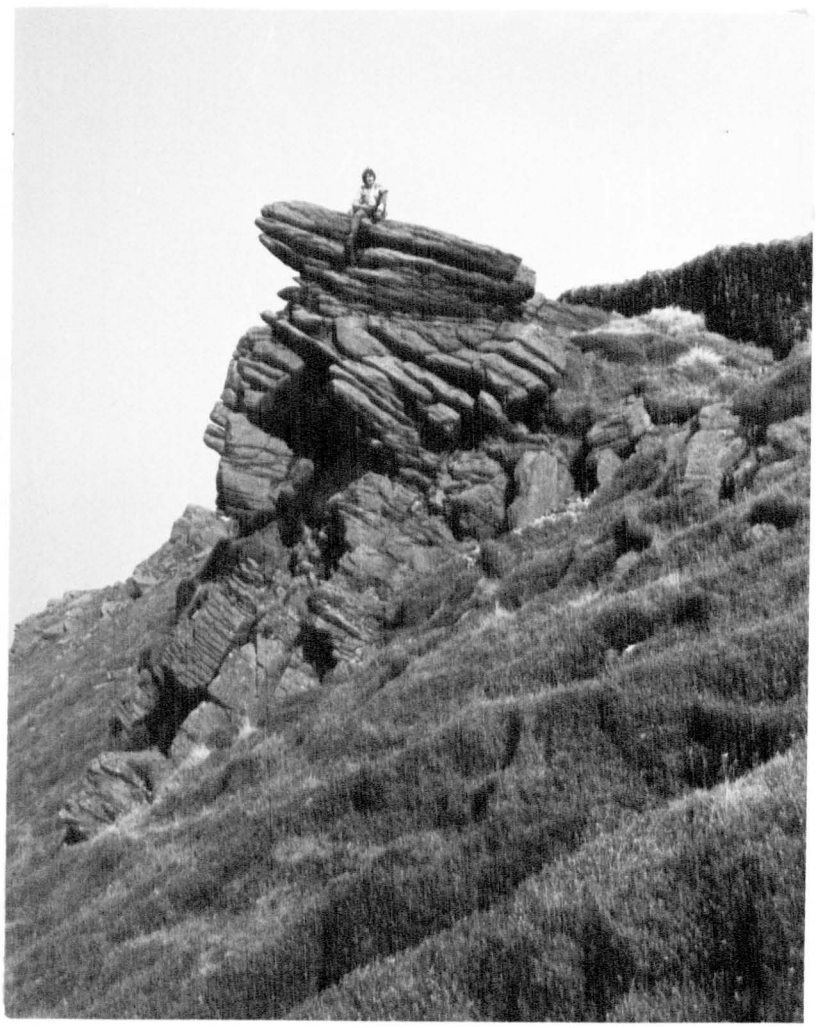


PHOTO 38.

Weathering styles in facies 11, Large scale cross-beds (Type A). Regional dip 4^{o} to the right. Barden Fell (SE08135874).

PHOTO 39.

Wedge shaped planar intrasets in facies 11, Large scale cross-bedded sandstones (Type A). Current flow from left to right. Length of tape 50cm. Rolling Gate Crag (SE00036010), Cracoe Fell.

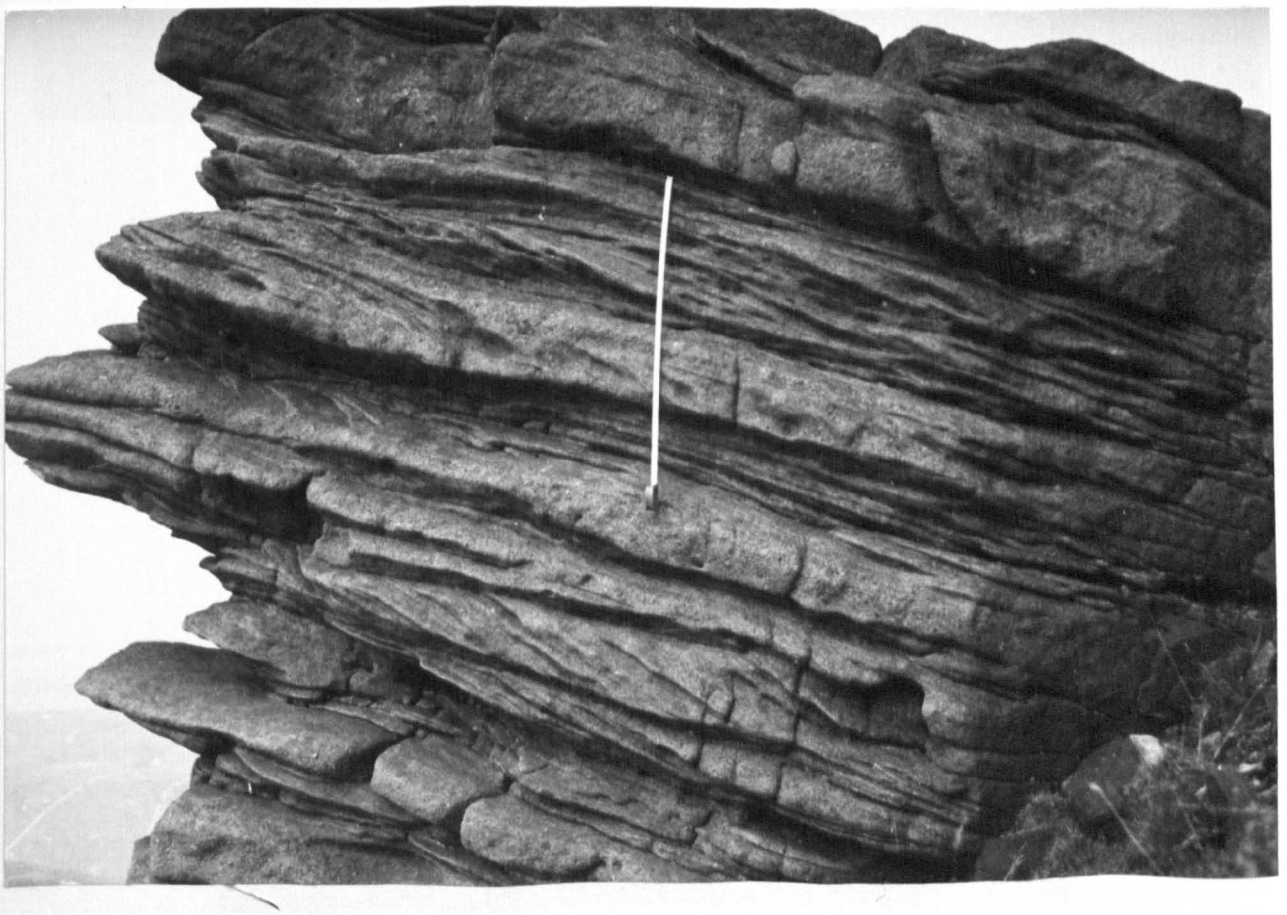


PHOTO 40.

Wedge shaped planar intrasets in facies 11, Large scale cross-beds (Type A). Note the preservation of topset, foreset and bottom set laminae in the intraset just above the tape measure. Current flow from right to left. Rolling Gate Crag (SE00036010), Cracoe Fell.

PHOTO 41.

Internal erosion scour in facies 11, Large scale cross-beds (Type A). Length of tape 1.5m. Carncliff Crags (SE07055845), Earl Seat, Barden Fell.

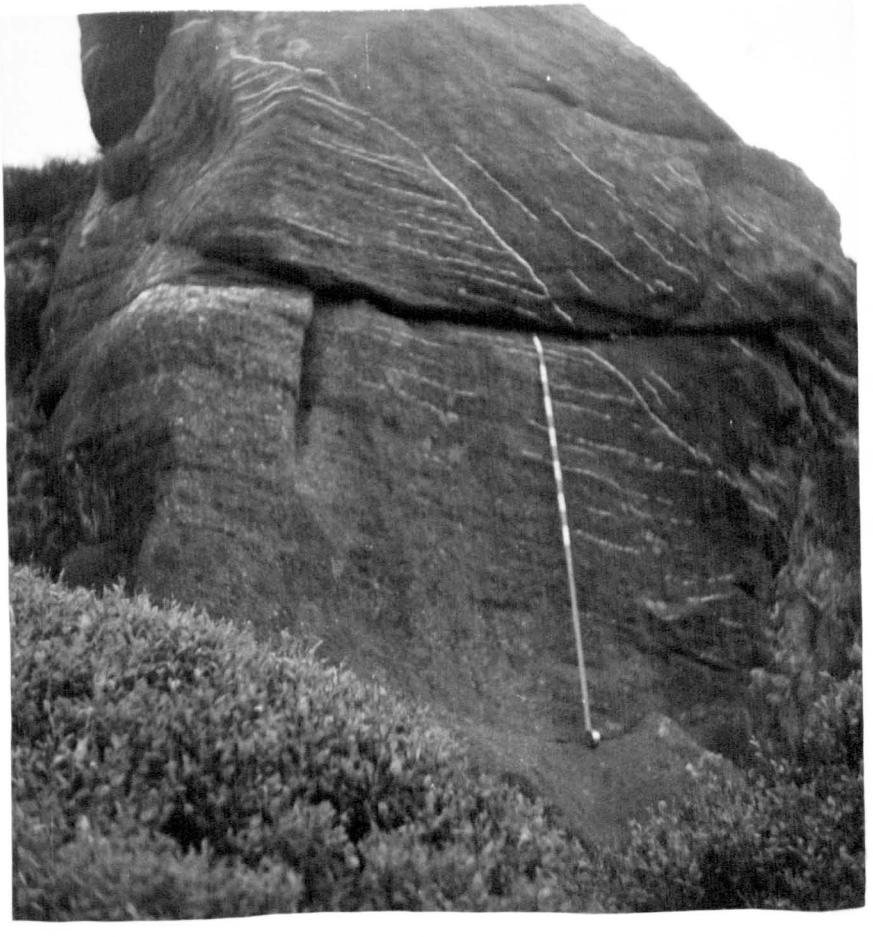


PHOTO 42.

Internal erosion surface in facies 11, Large scale cross-beds (Type A). Lords Seat (SE08475988), Pockstones Moor.

PHOTO 43.

Internal erosion surface in facies 11, Large scale cross-beds (Type A). Erosion surface is arrowed. The pebbly nature of the sediments is well displayed in the top right of the photograph. Hammer (centre) for scale. Lords Seat (SE08475998), Pockstones Moor.

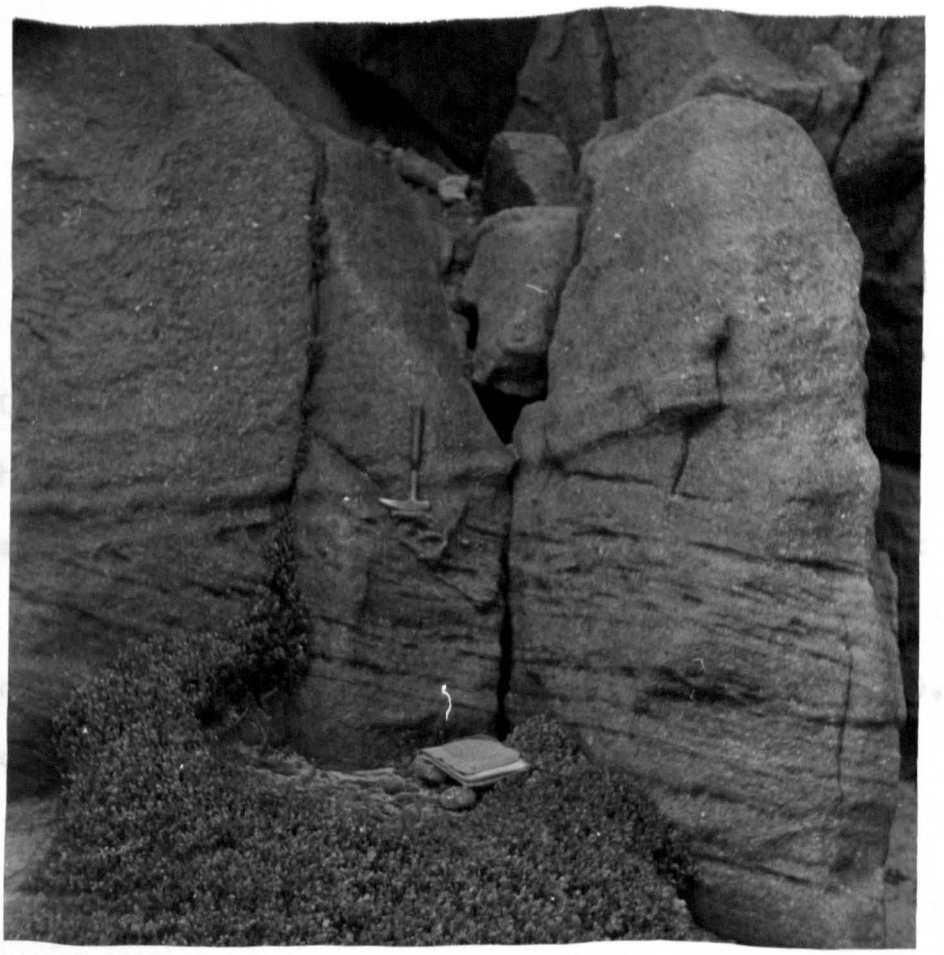
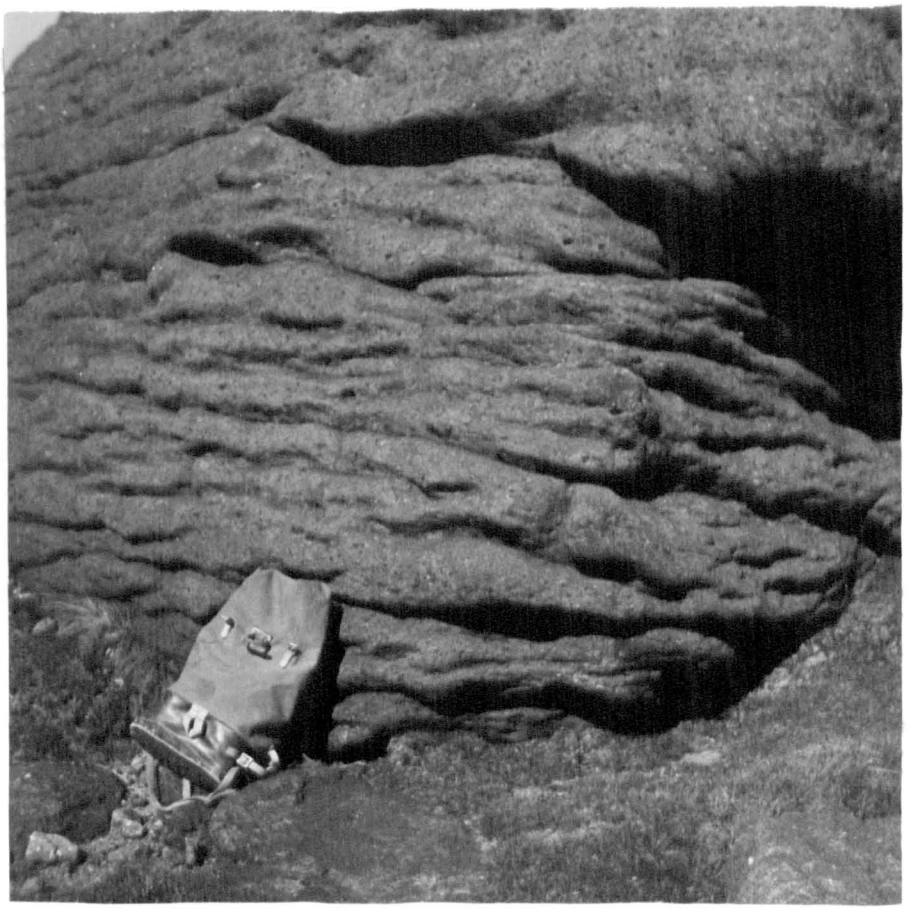


PHOTO 44.

Weathering style in facies 11, Large scale cross-bedded sandstone. This style of weathering is very reminiscent to that seen in facies 9, Ropy weathering sandstone (see Photo 23). Watt Crag. Cracoe War Memorial (SD99275886), Cracoe Fell.

PHOTO 45.

Trough shaped intrasets in facies 11, Large scale cross-bedded sandstone (Type A). The large scale foreset dips to the right indicating the flow of the current was from left to right. Note, however, the lower intraset shows a reciprocal direction. The Crags (SD99655960), Cracoe Fell.



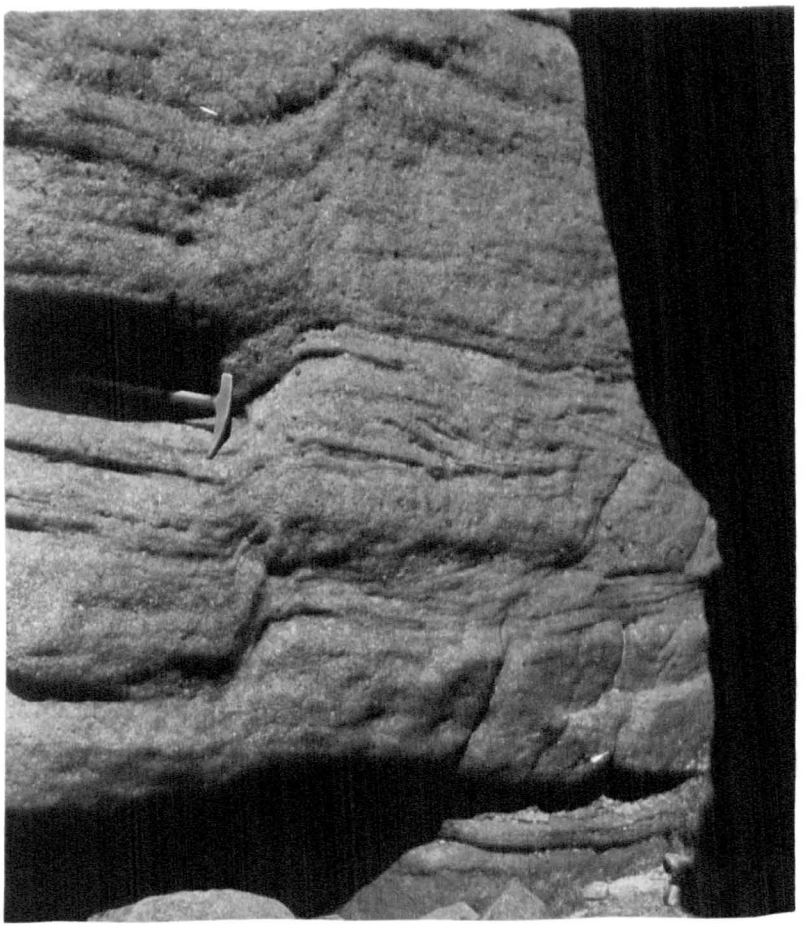
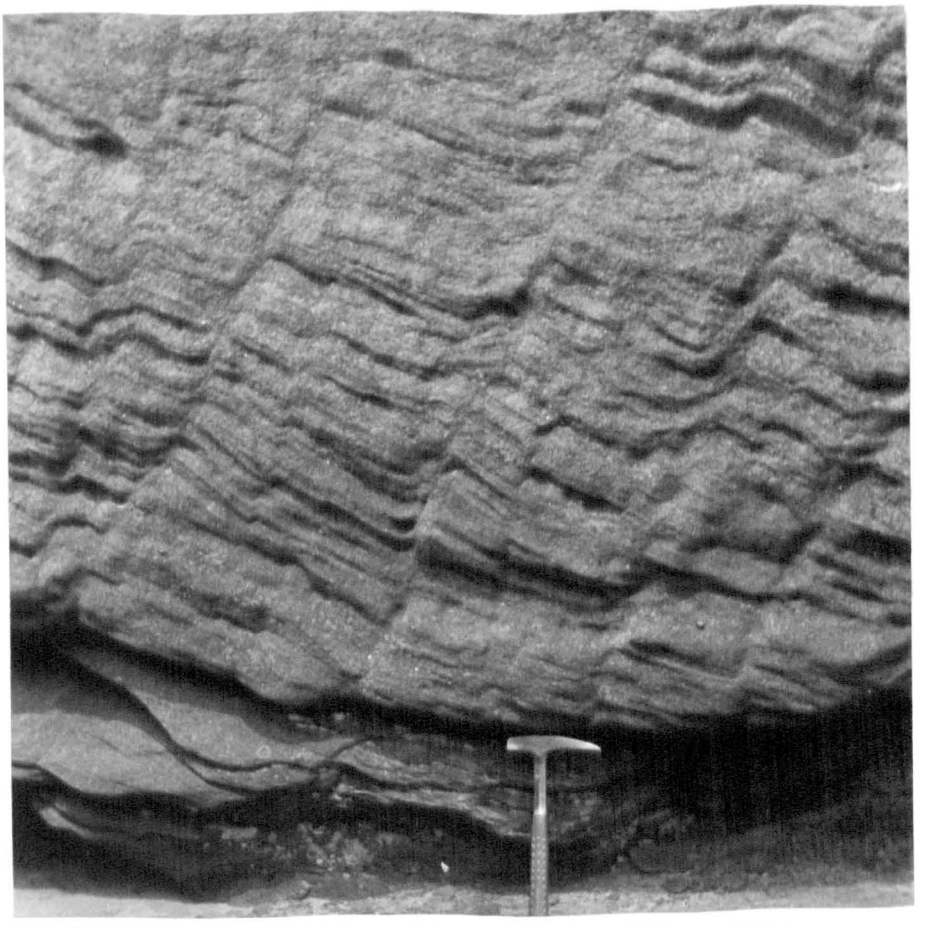


PHOTO 46.

Multiple deformation structures in the lower part of facies 11, Large scale cross-bedded sandstone foresets. The 'shear plane' is normal to the foreset azimuth. Lords Seat (SE08435988), Pockstones Moor.

PHOTO 47.

Large shear deformation structure in facies 11, Large scale cross-bedded sandstone (Type A). The structure has a near vertical orientation and can be seen just left of the dark shadow. Hammer (centre left) for scale. Figure 18 was drawn on the other side of this Crag. The Crags (SD99655960), Cracoe Fell.



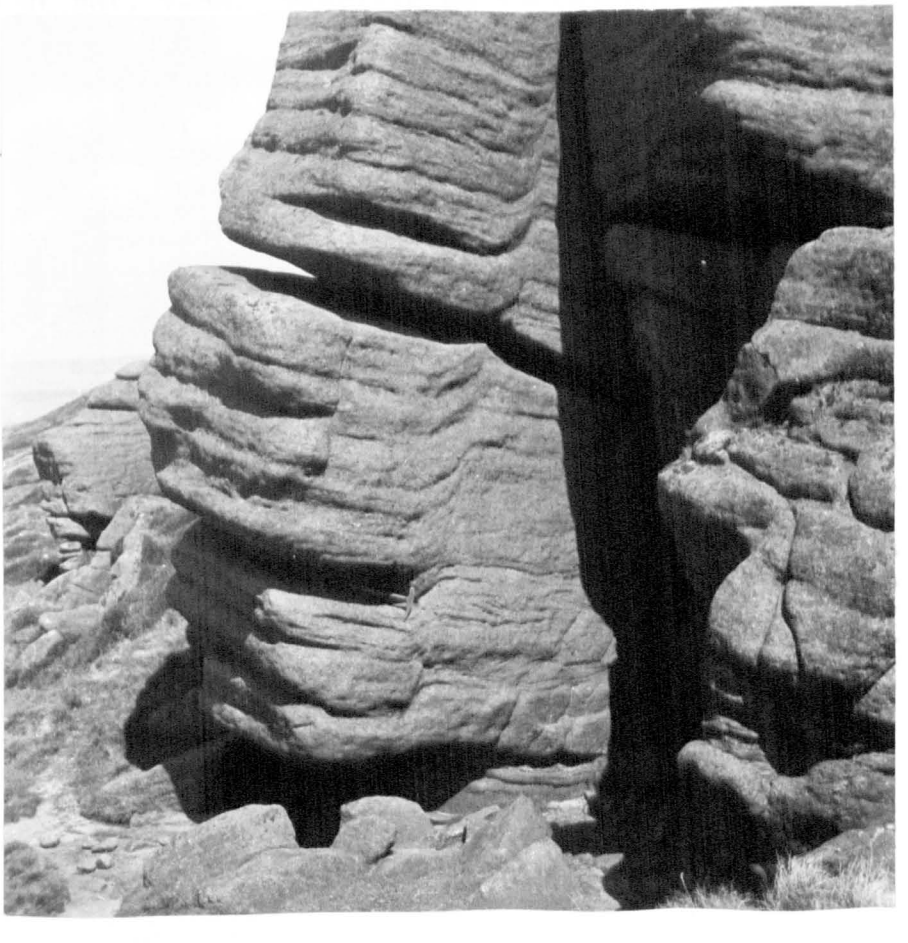


PHOTO 48.

Facies 11, Large scale cross-bedded sandstones (Type B). Note the low angle of the foresets when compared with the Type A large scale foresets (e.g. Photo 37). This outcrop is reminiscent of the R_1 Kinderscout Grit, Large scale sets seen at Mouselden Quarry (Collinson 1968, Fig. 10). Height of set, 7-8m. Overlain by facies 10, Medium scale cross-beds. See also Figure 17 and 33). Hardacre Quarry (SE00904679), Farnhill.

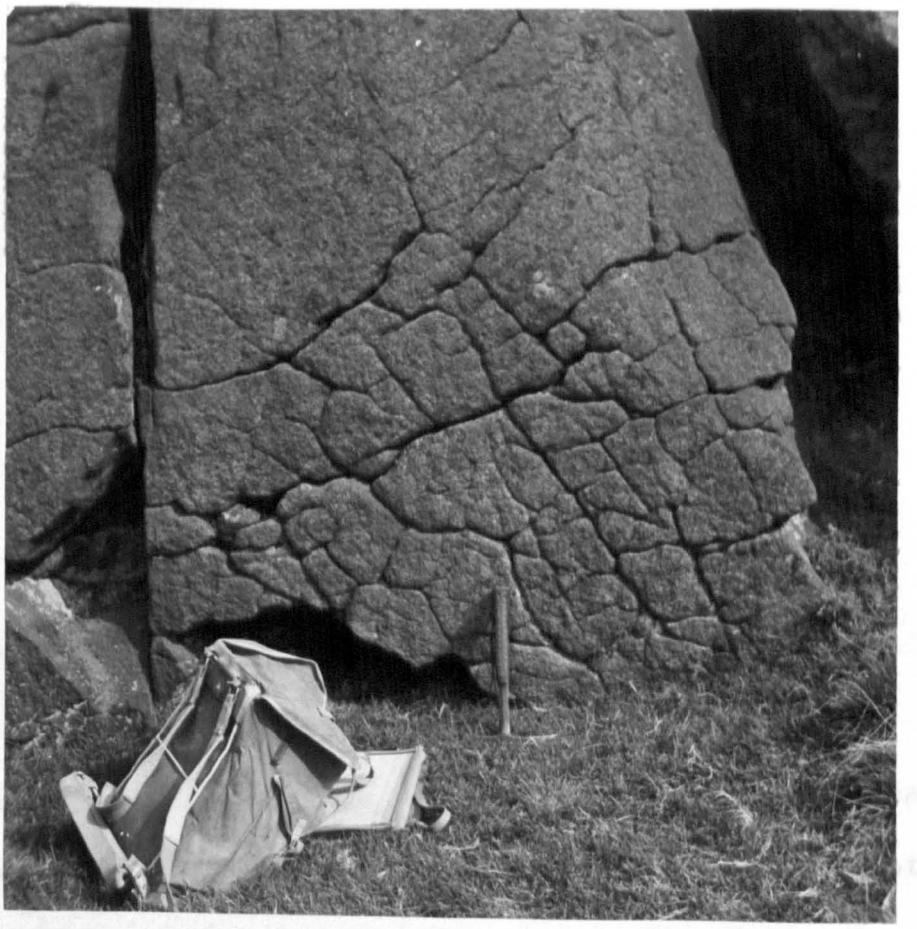

ODDBALL
B
ODDBALL

PHOTO 49.

Facies 12, Massive weathering sandstone. Note the highly distinctive blocky and hexagonal weathering patterns. Slope Association. Near Studfold Farm (SE02645477), Eastby.

PHOTO 50.

Facies 12, Massive weathering sandstone showing blocky weathering pattern. Hammer (centre) for scale. Top of Slope Association Beamsley Beacon (SE09605227).



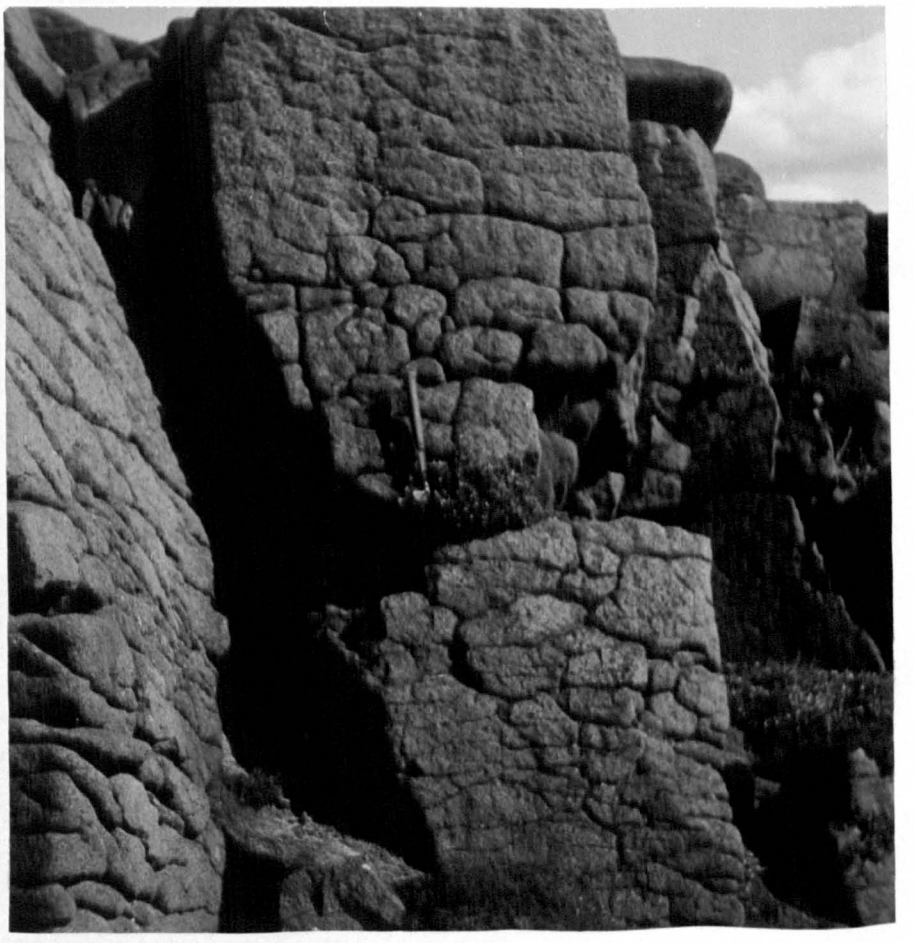


PHOTO 51.

Facies 12, Massive sandstone. Note the similarity in weathering pattern with Photo 44 (Facies 11, Large scale cross-bedded sandstone) and Photo 26 (Facies 9, Ropy weathering sandstone). Hammer (centre) for scale. Top of the Slope Association. Beamsley Beacon (SE09605227).

PHOTO 52.

Facies 7, Composite Sandstones. Turbidite Association. Jenny Gill Quarry (SE00365097). The Composite Sandstones have an erosive base (dashed) and cut into facies 1, Mudstones and facies 6, Thin turbidite sandstones. (small boy, left of centre for scale).

PHOTO 53.

Imbrication of mudstone clasts in facies 7, Composite sandstones. Current flow from left to right. Lens cap (centre left) is 7cm long. Turbidite Association. Jenny Gill Quarry (SE00365095), Skipton Moor.

PHOTO 54.

Sharp, planar basal surface to facies 6, Ropy weathering sandstone. Rucksack and map case (centre left) for scale. Turbidite Association. (See also Photo 55). Butler Hill (SD98424924), Carleton.

PHOTO 55.

Oblique aerial view of the Pendle Grit/Turbidite Association channels to the west of the Aire Valley. The Upper Bowland Shales form the broad slope of the first feature (left centre) and beyond it, to the left of the road, the channels can be seen as a series of discreet but mappable features. (See Enclosure H). The location of Photo 54 is indicated by an arrow. Carla Beck Wood (SD978491) is on the right.

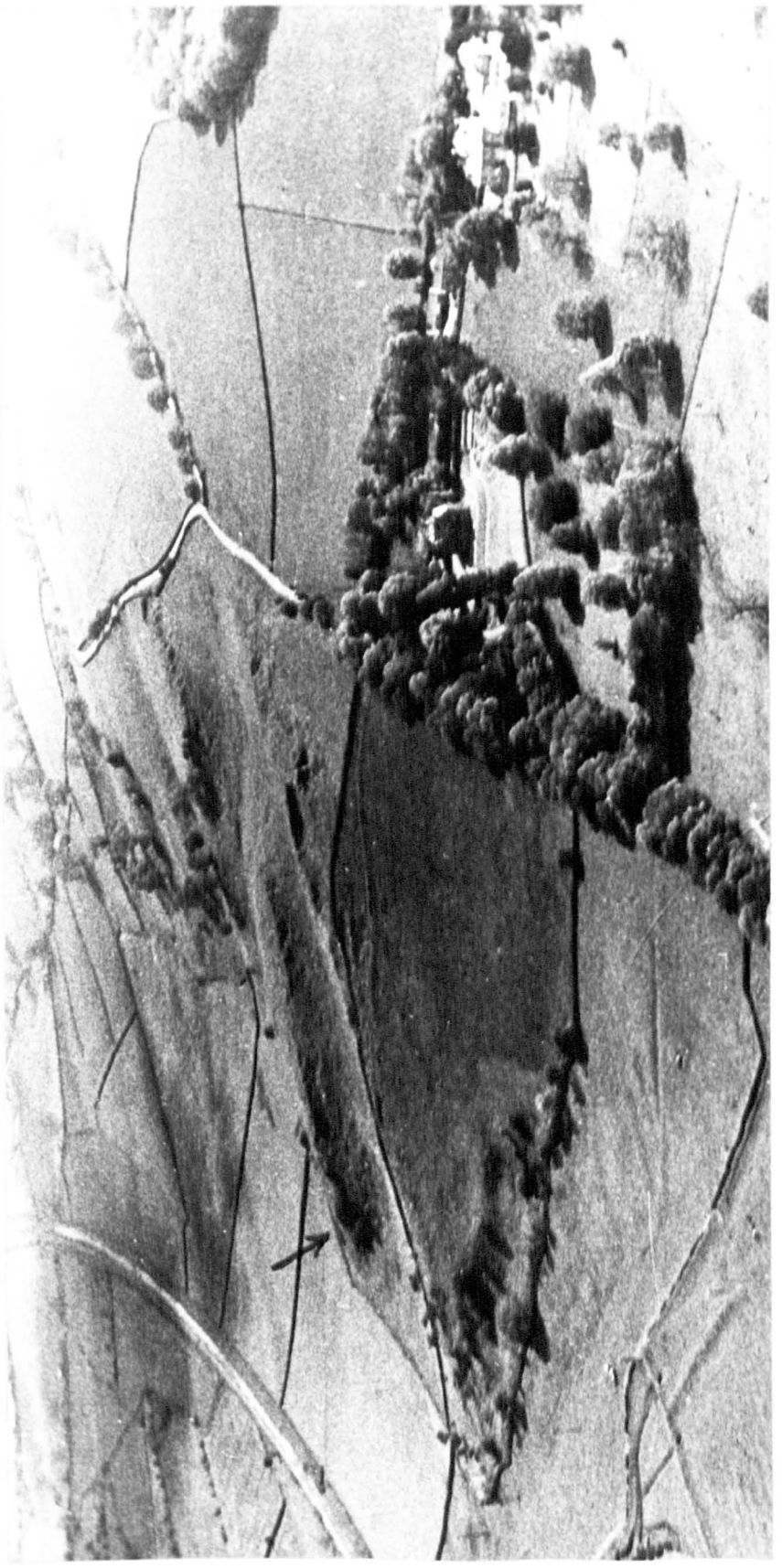


PHOTO 56.

Oblique aerial view of Skipton Moor showing the topographic features which have been related to channels in the Turbidite Association. The Triangulation Point (SE01405090) on Skipton Moor is indicated with an arrow. The Upper Bowland Shales form the long poorly drained slope immediately above the wall (foreground). The Composite Sandstone sub-association forms a poorly defined feature just below the wood.

PHOTO 57.

Oblique aerial view looking towards Nor Hill (SE021509), Potters Gill (SE02455132) is on the left.

PHOTO 58.

Oblique aerial view looking across the Vicar's Allotment (SE012508) towards Standard (SE00845032); the mast is arrowed. The fore slope is formed from the Upper Bowland Shales. The Composite sandstones sub-association seen in Jenny Gill Quarry (SE00365097) continues in the small feature below the trees. The long slope below the Standard is formed from Slope Association sediments; note the absence of channels compared with the Turbidite Association sequence.

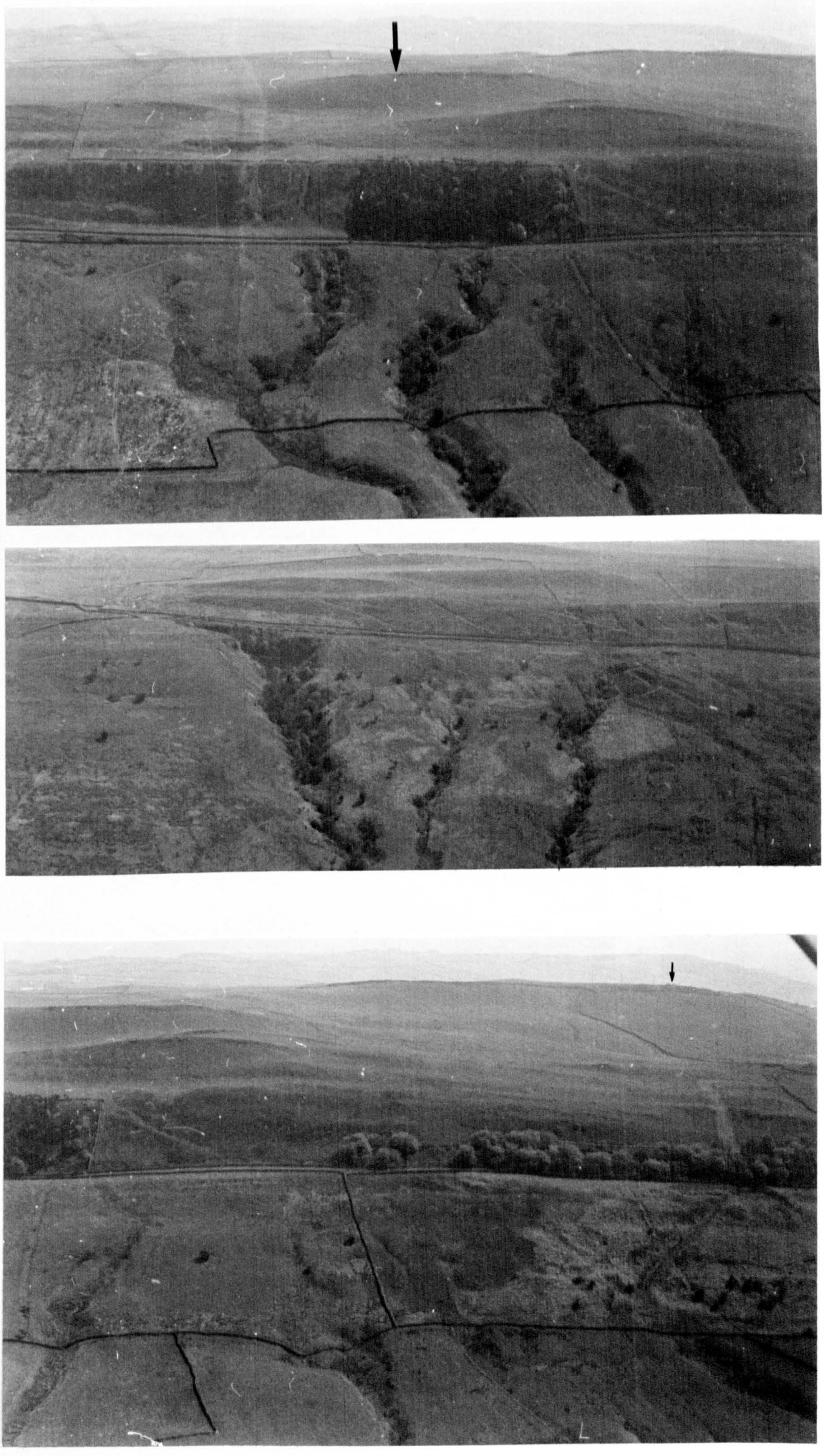


PHOTO 59.

Intercalations of black mudstones and thin turbidite sandstones forming the lower part of the Slope Association. Hammer (centre) for scale. Near the confluence of Howgill Sike with Kex Beck (SE09225313). Beamsley.

PHOTO 60.

Weathered out hollow of a log (centre right) and mudstone clasts (centre left). Facies 10, Medium scale cross-bedded sandstones.

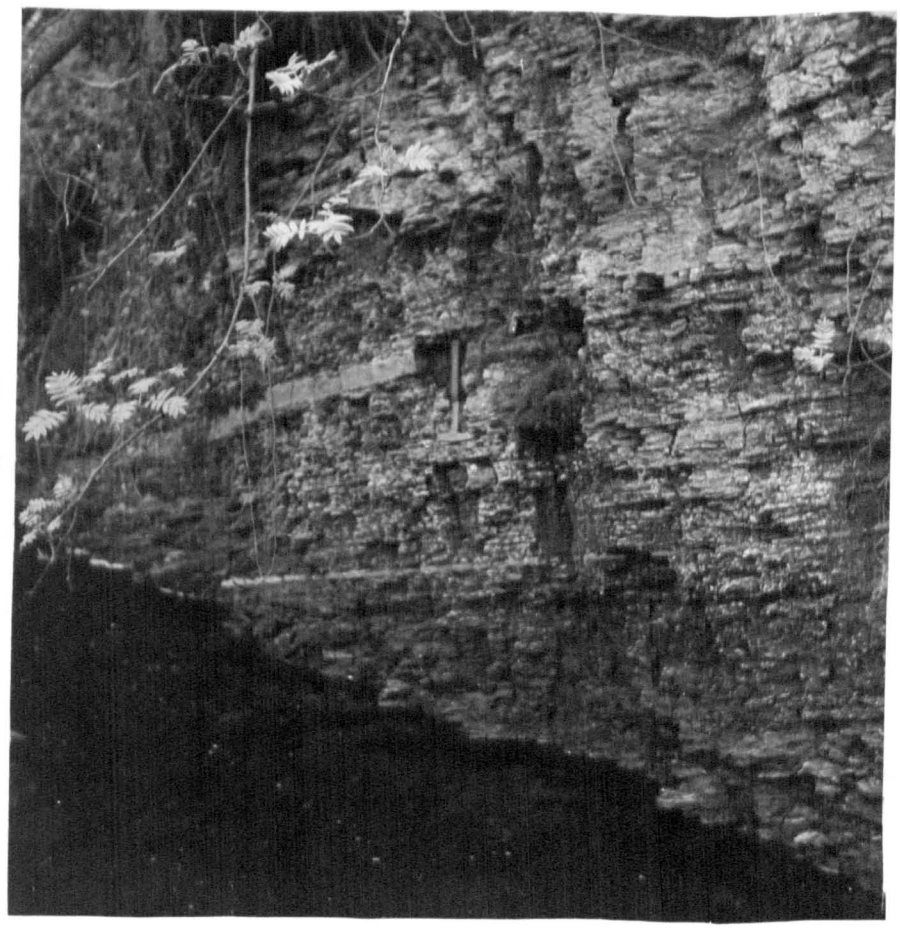


PHOTO 61.

Slumped mudstone and turbidites towards the top of the Turbidite Association. Confluence of Howgill Sike with Kex Beck (SE09185313), Beamsley.

PHOTO 62.

<u>?Arenicolites</u> -- negative epirelief on a facies 6, Thin turbidite sandstone. Turbidite Association.

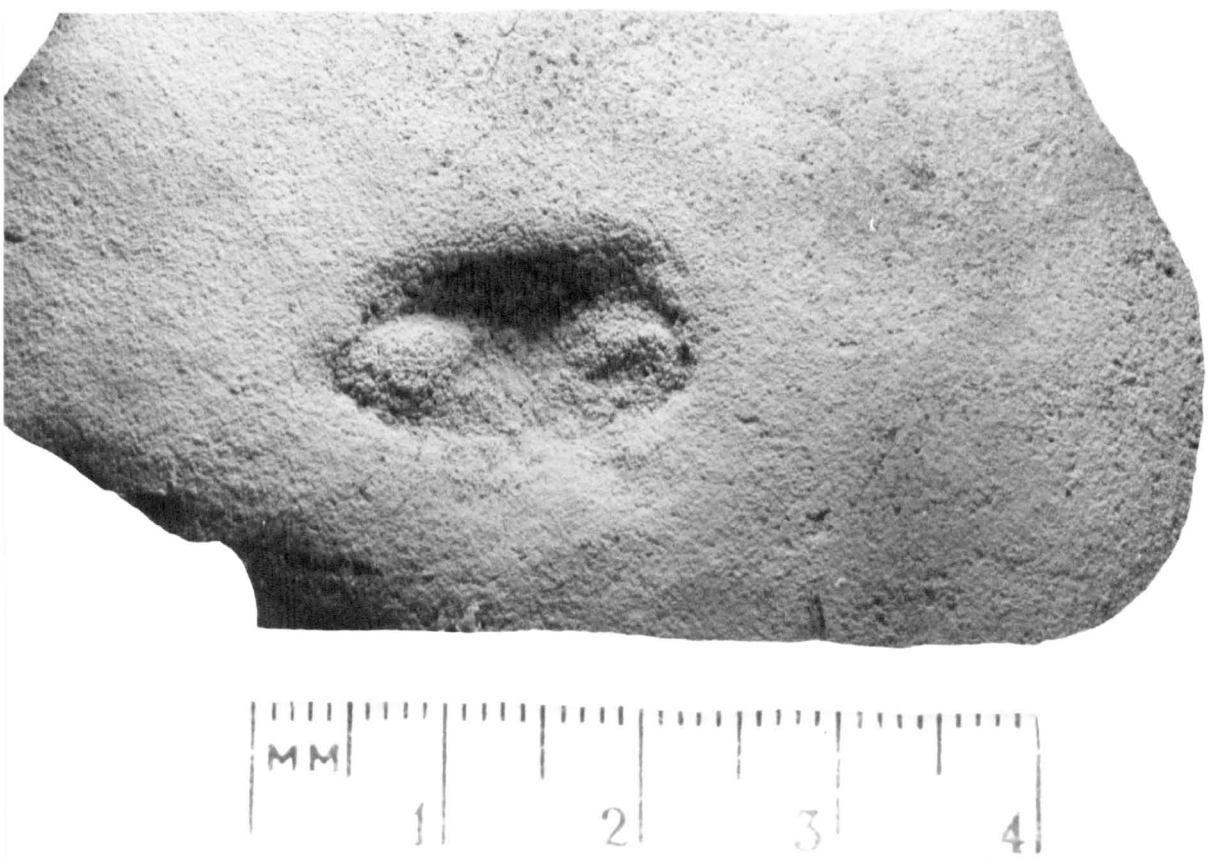

MM
1
2
3
4

PHOTO 63.

?Arenicolites -- at least three negative epireliefs on facies 6, Thin turbidite sandstones. Note the distinctive bow shaped linguoid ripples. Turbidite Association.

PHOTO 64.

?Arenicolites -- negative epirelief. Turbidite Association.


30 CMS.


MM
1
2
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4

PHOTO 65.

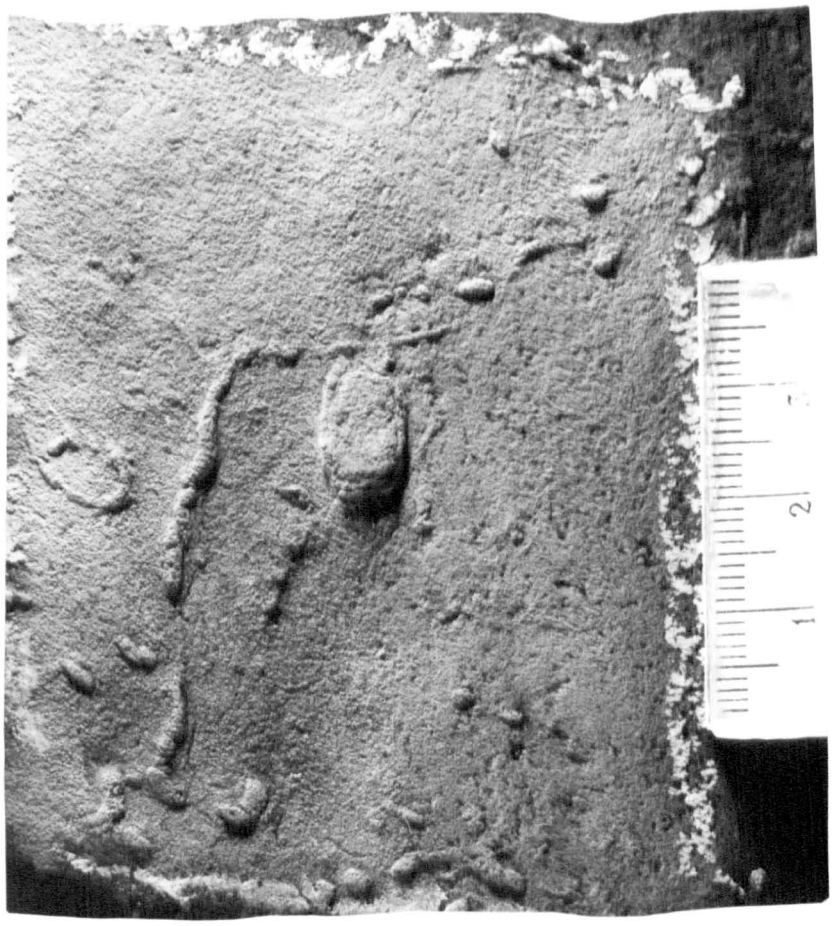
Arthrophycus -- positive hyporelief (centre). Other structures are probably positive hyporeliefs of Planolites. Facies 6, Thin turbidite sandstone. Turbidite Association.

Specimen 96, Catlow Gill (SD96204913), Carleton.

PHOTO 66.

Arthrophycus -- positive hyporelief (centre) on facies 6, Thin turbidite sandstone. Other structures are probably positive hyporeliefs of Planolites. Turbidite Association.

Specimen 96, Catlow Gill (SD96204913), Carleton.



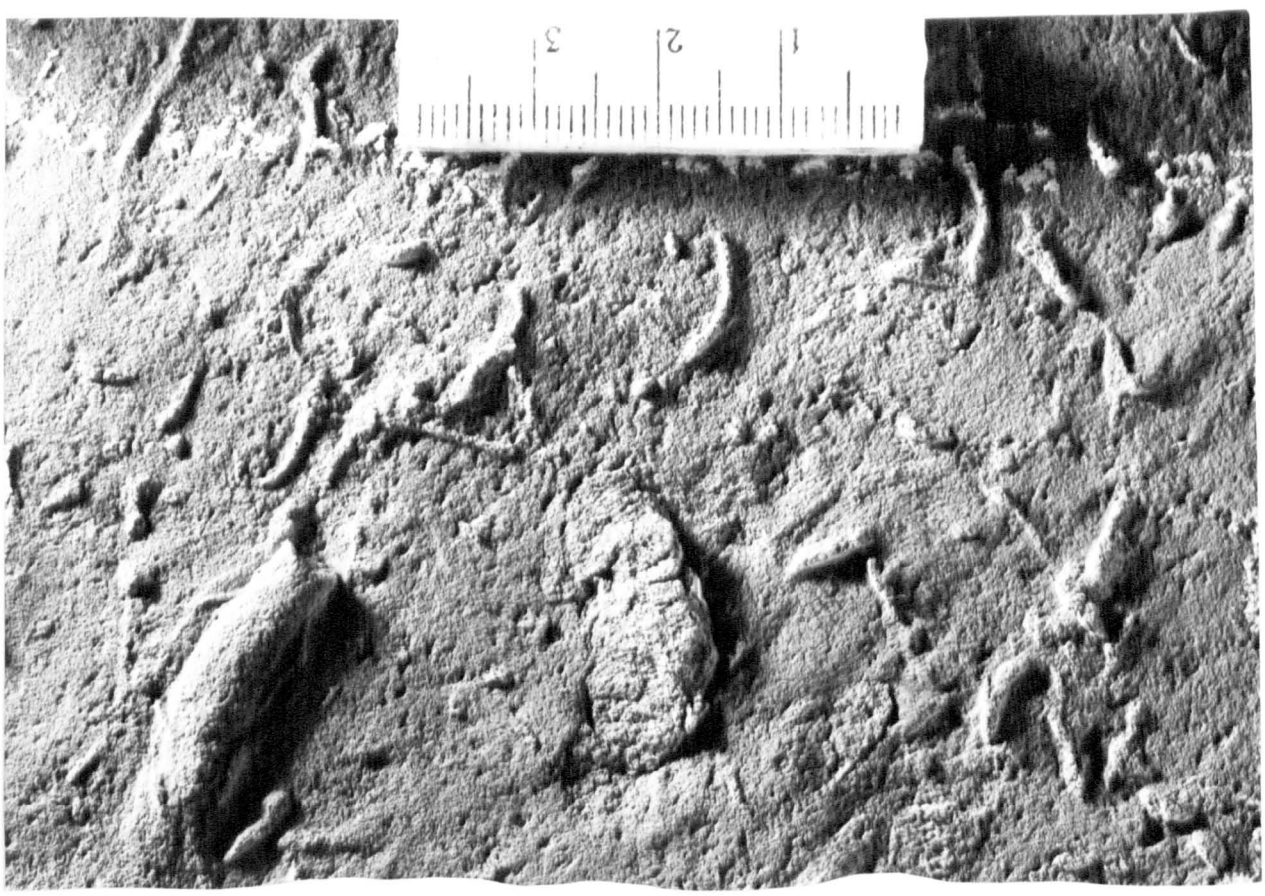


PHOTO 67.

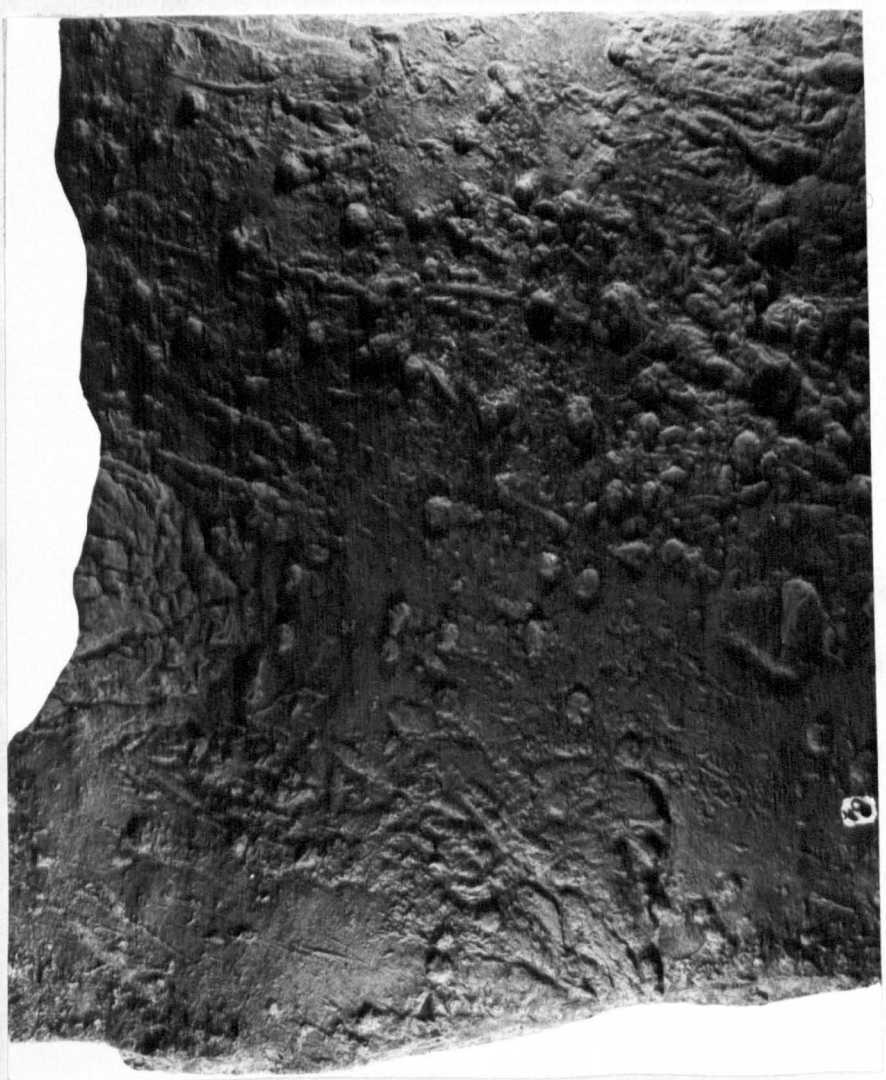
Bergaueria -- positive hyporeliefs on the sole of a facies 6, Thin turbidite sandstone. Note the specimen of Muesteria in the bottom left hand corner (see Photo 92). Slab is 30cm wide.

Turbidite Association. Specimen 96. Catlow Gill (SD9620913), Carleton.

PHOTO 68.

Bergaueria -- positive hyporeliefs on the sole of a facies 6, Thin Turbidite sandstone. Specimen is 50 cm wide. Turbidite Association. Specimen 84. Catlow Gill (SD9620913), Carleton.

15 CMS.



APPROX 50 CM.

PHOTO 69.

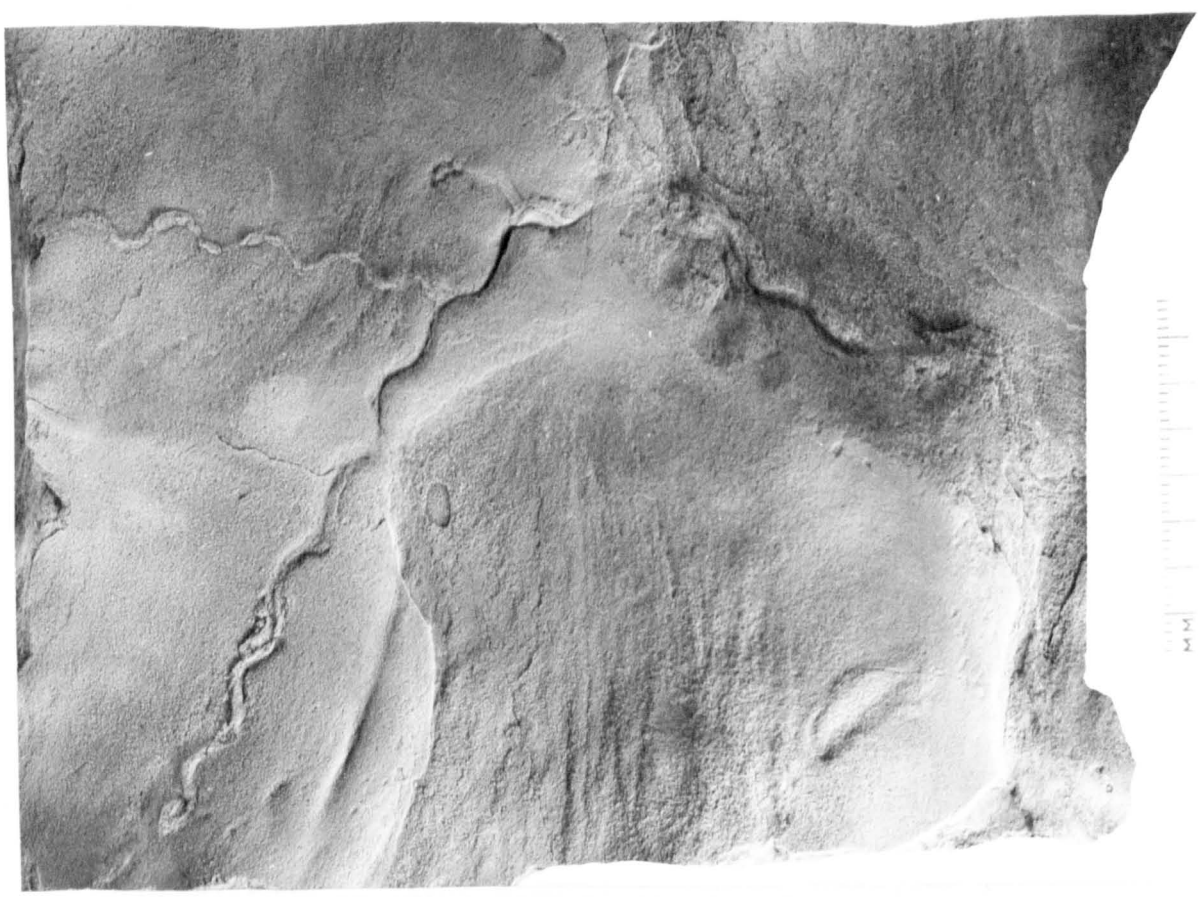
Cochlichnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 260, Vicar's Allotments (SE007506), Skipton Moor.

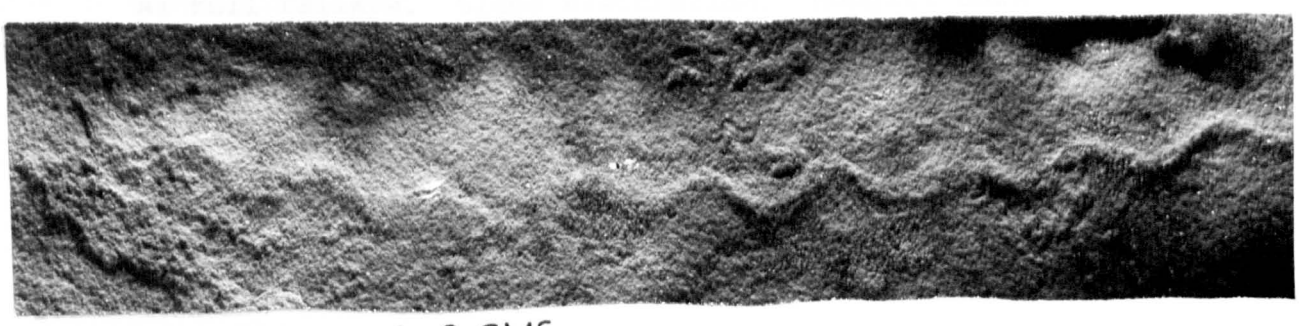
PHOTO 70.

Cochlichnus -- positive and negative epireliefs on the bow shaped linguoid rippled top of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 264. Vicar's Allotments (SE007506), Skipton Moor.

PHOTO 71.

Cochlichnus -- parting plane full reliefs. Facies 4, Parallel bedded and striped siltstone. Slope Association. Specimen 146. Waterfall Gill (SD98305675), Rylstone Fell.





2 CMS.

PHOTO 72.

?Curvolithus -- parting plane full relief of trilobate trail. Facies 4, Parallel bedded and striped siltstone. (Note also the two Tigillites structures towards the bottom right). Slope Association. Specimen 267. Low Snaygill (SD99854980), Skipton.

PHOTO 73.

?Curvolithus -- large slab of facies 4, Parallel bedded and striped siltstone showing meandering burrows preserved as full reliefs. Slope Association. Howgill Beck (SE09335304), Beamsley.

@ 50 CMS

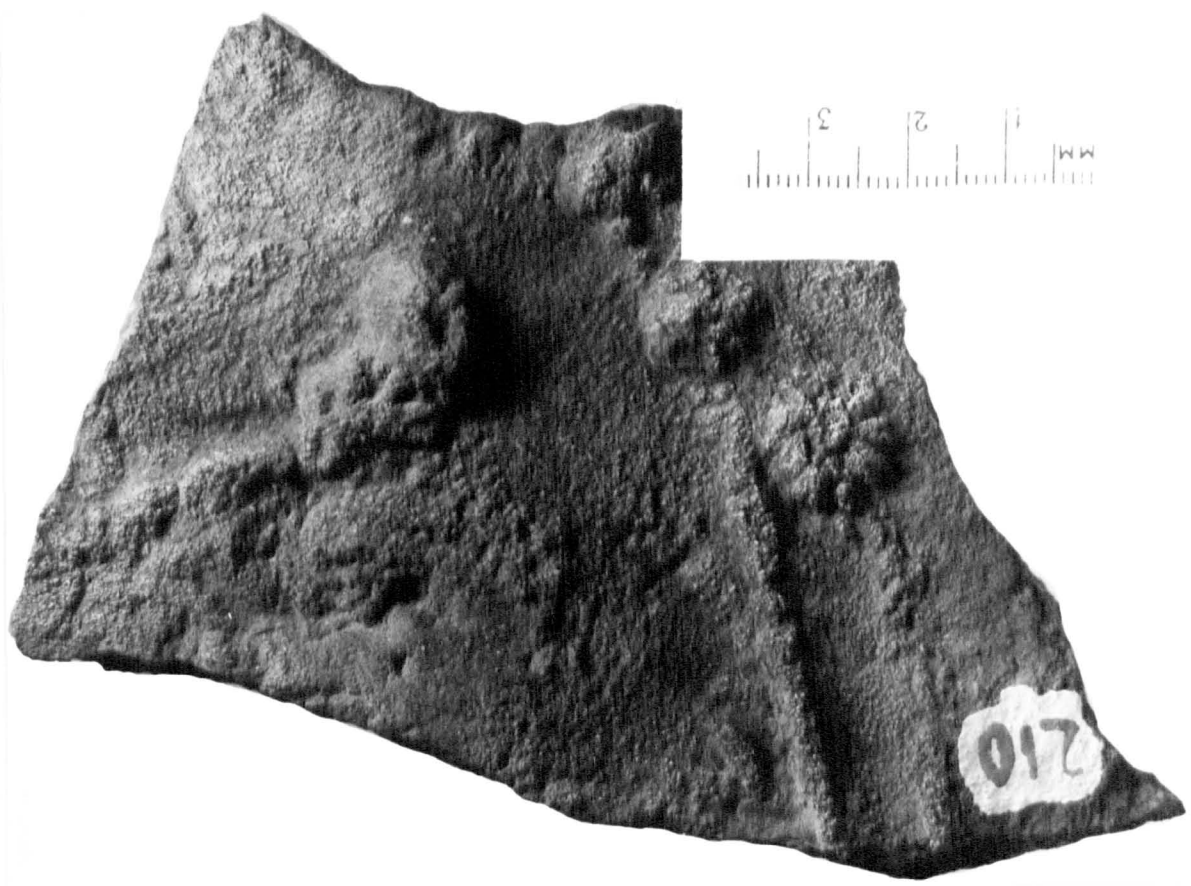
PHOTO 74.

Didymaulichnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Note the two Bergaueria positive hyporeliefs on the right hand side. Length of specimen is 30cm. Turbidite Association. Specimen 152. Cawder Gill (SE00255024). Skipton Moor.

PHOTO 75.

Gyrophyllites -- rose stellate positive hyporeliefs on the sole of a facies 6, Thin turbidite Sandstone. Junction between Turbidite and Slope Association. Specimen 210. Cawder Gill (SE5152543), Skipton Moor.


5 CMS.


MM
1
2
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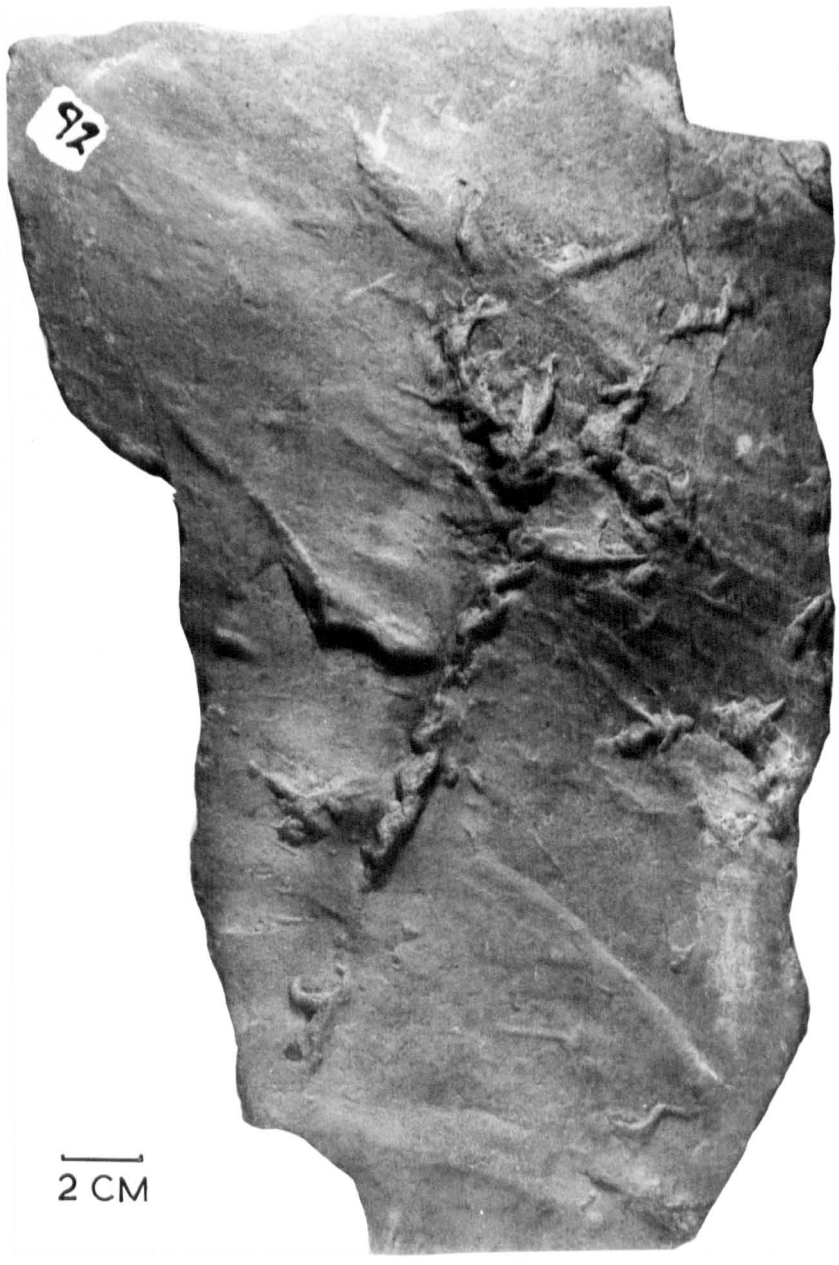
210

PHOTO 76.

?Helicolithnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Width of specimen @ 20 cm. Turbidite Association. Specimen 92. Cawder Gill (SE51205024), Skipton.

PHOTO 77.

Lophoctenium aff. L. comosum -- parting plane full relief on facies 4, Parallel bedded and striped siltstone. Slope Association. Specimen 148. Low Snaygill (SD99834980), Skipton.


92
2 CM

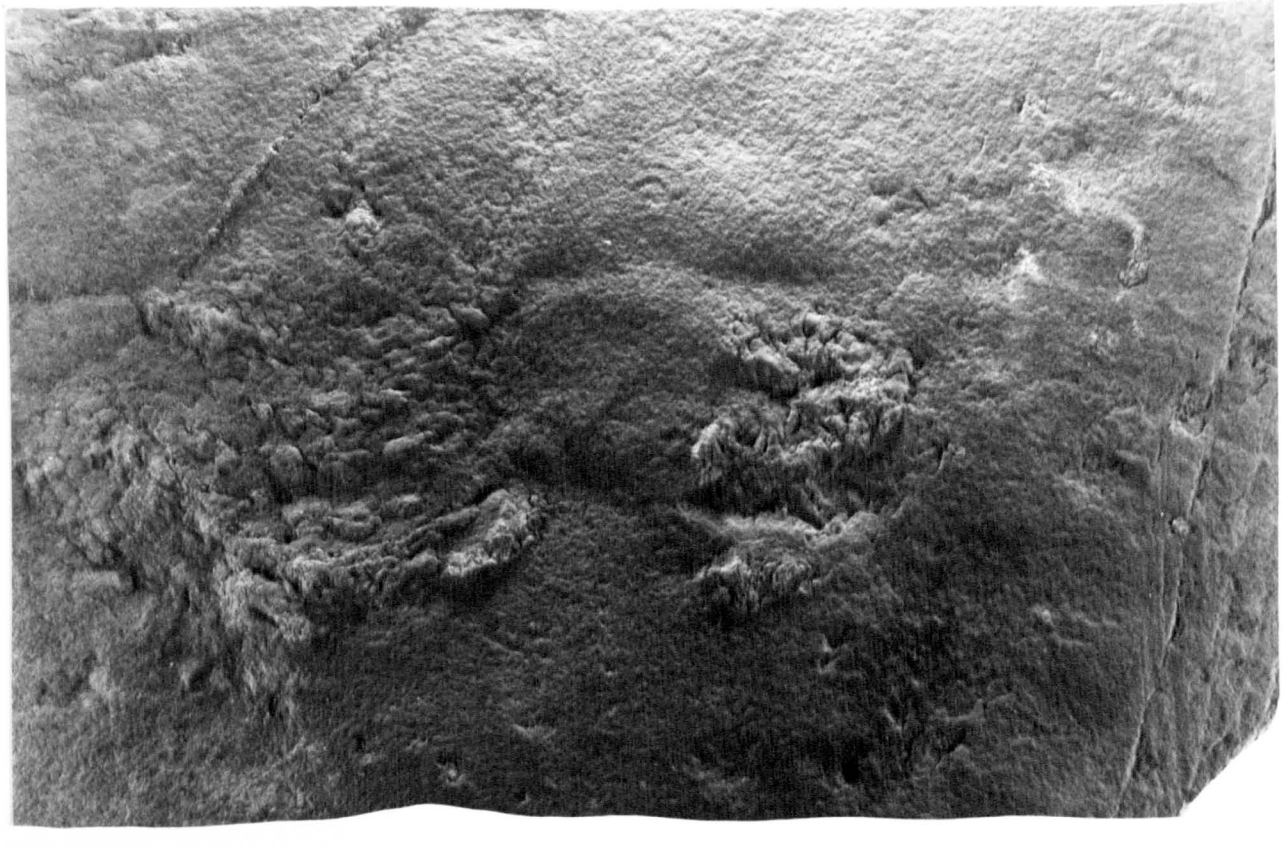
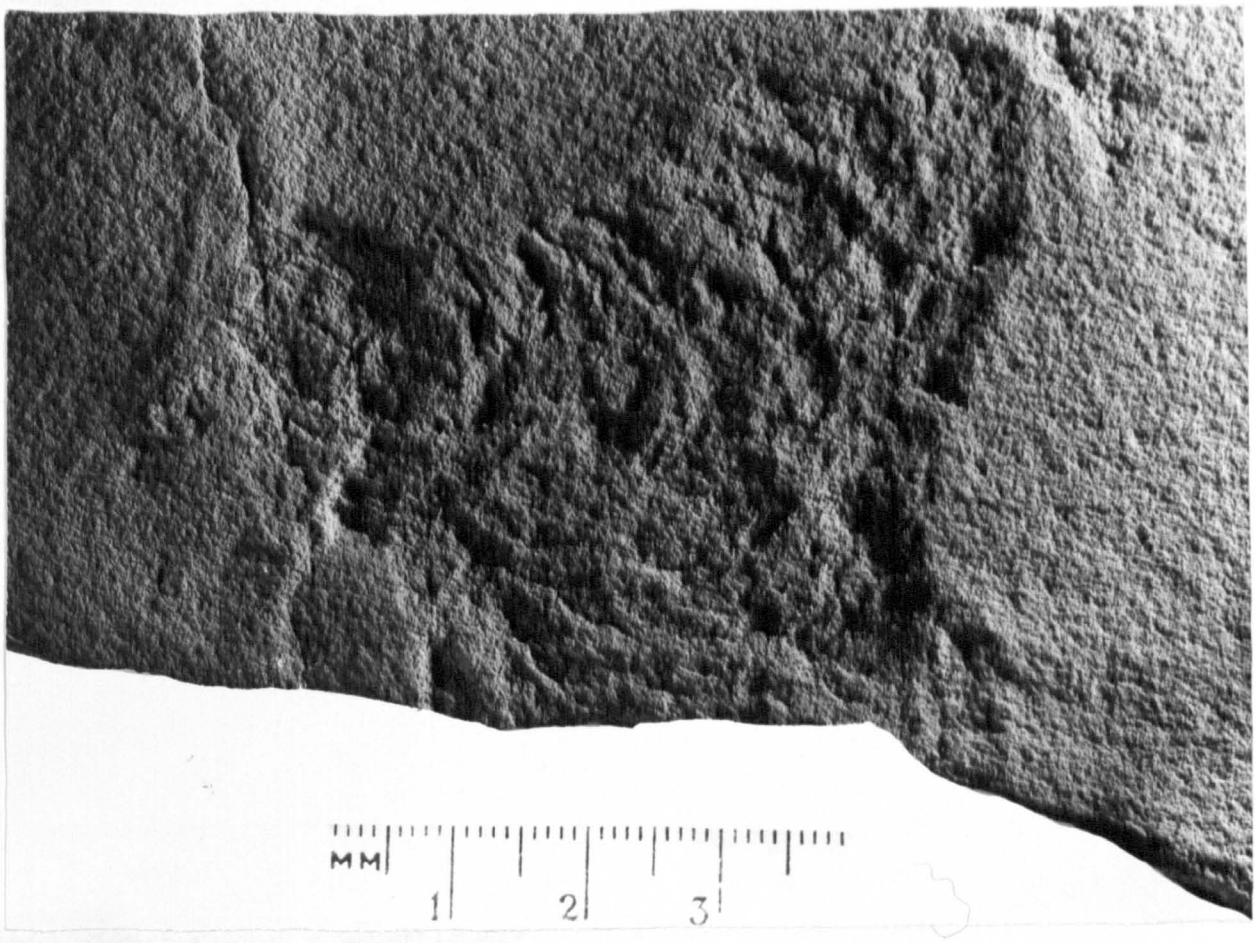


PHOTO 78.

Lophoctenium haudimmineri -- parting plane full relief on facies 4, Parallel bedded and striped siltstone. Slope Association. Specimen 150. Low Snaygill (SD99834980), Skipton.

PHOTO 79.

Lophoctenium -- parting plane full relief on facies 4, Parallel bedded and striped siltstone. Slope Association. Low Snaygill (SD99834980), Skipton.


MM
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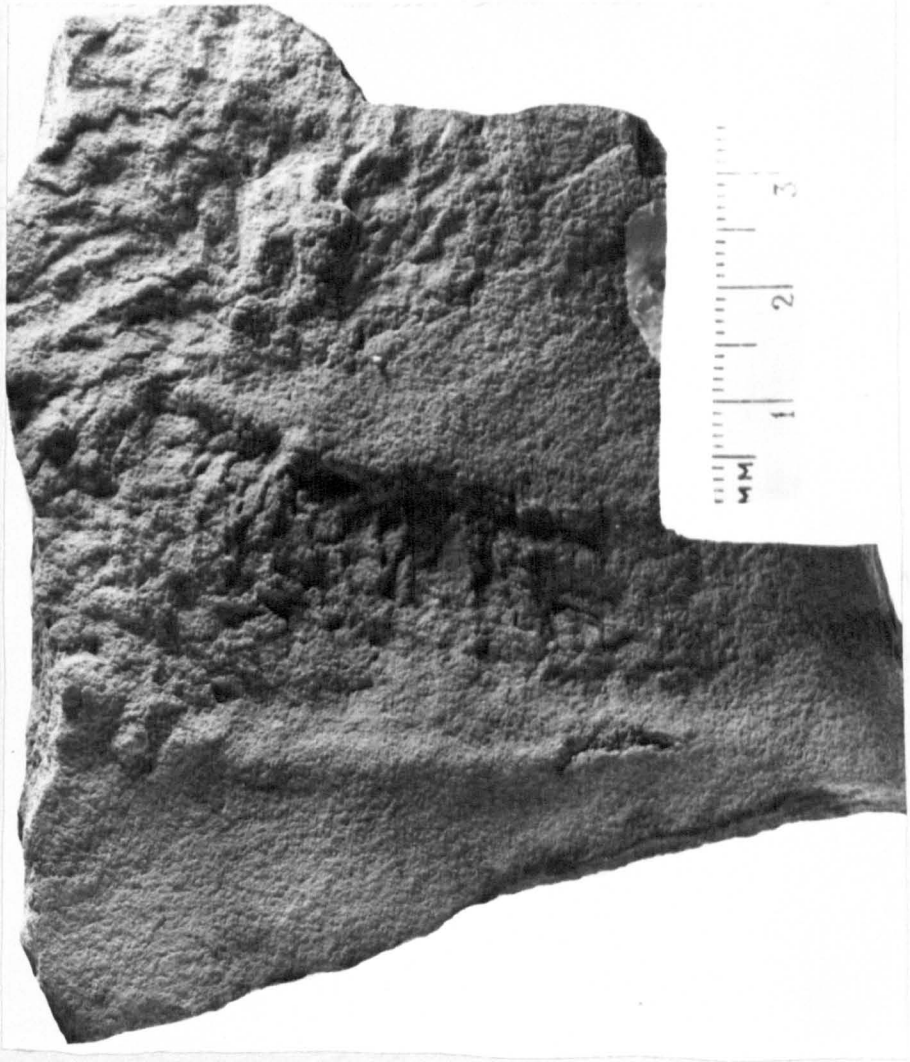
MM
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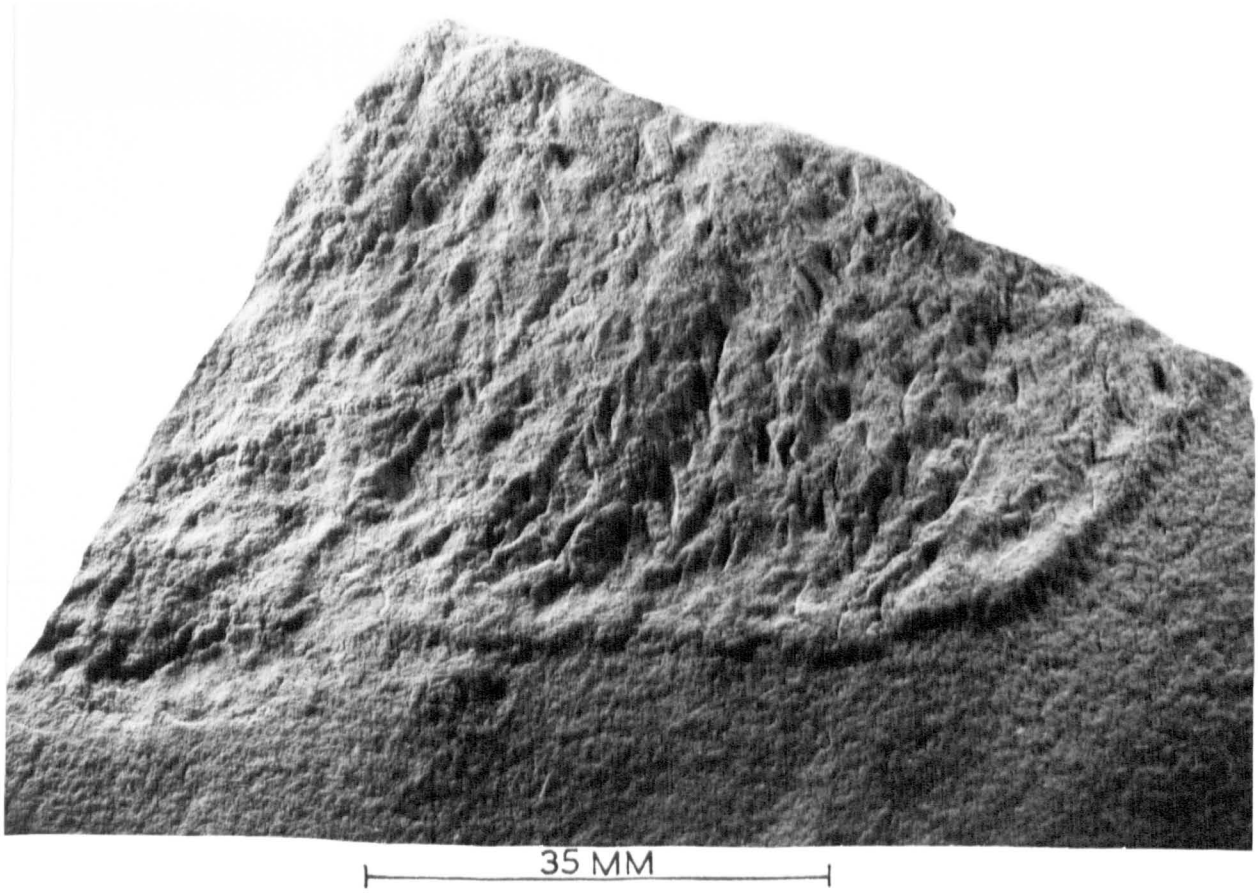
PHOTO 80.

Lophoctenium haudimmineri -- parting plane full relief on facies 4, Parallel bedded and striped siltstone. Structure is 70mm long. Slope Association. Specimen 148. Low Snaygill (SD99524954), Skipton.

PHOTO 81.

Lophoctenium -- parting plane full relief preserved on facies 4, Parallel bedded and striped siltstone. Compare with Fig. 57. Specimen is 20cm wide. Slope Association. Specimen 143. Pickles Gill (SE58165557), Hazlewood.


35 MM


5 CM

PHOTO 82.

Mammillichnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 213. Cawder Gill (SE00135018), Skipton Moor.

PHOTO 83.

Mammillichnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association.

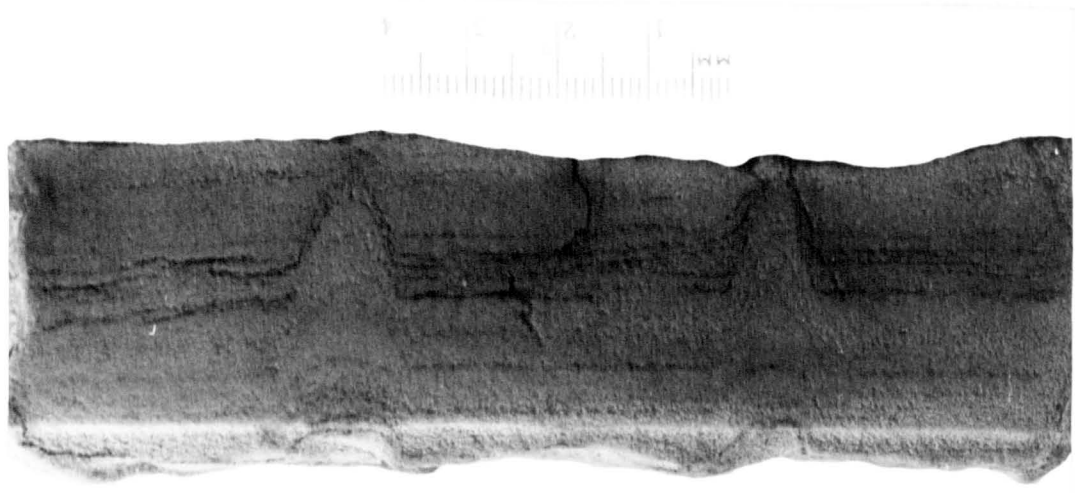
20MM

PHOTO 84.

Mammillichnus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 213. Cawder Gill (SE00135018), Skipton Moor.

PHOTO 85.

Monocraterion -- side view of funnels. Facies 8, Parallel bedded sandstone. Specimen 370. Threapland Gill (SD99885980), Cracoe Fell.


MM

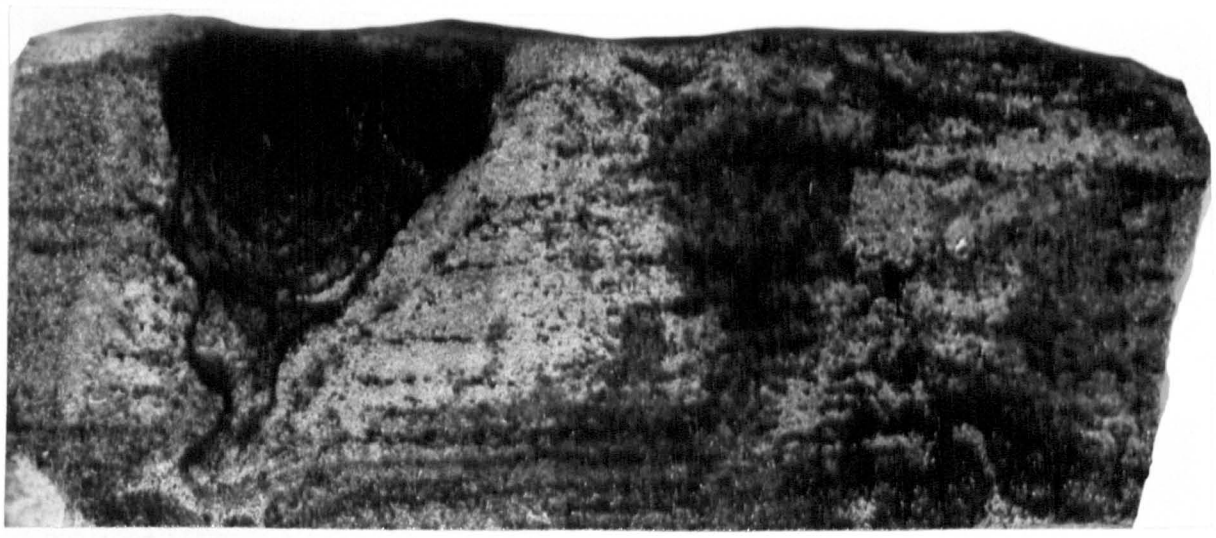

MM
1
2
3

PHOTO 86.

Monocraterion -- side view of a block of facies 8, Parallel bedded sandstone, showing rotated and slumped infill to a funnel structure. Specimen height 40mm. Specimen 131. Threapland Gill (SD99915980), Cracoe Fell.

PHOTO 87.

Monocraterion -- positive hyporeliefs showing a current scour effect around the resistant vertical burrow. In this example, the funnel is immediately above the scour (into the page). Specimen 370. Hesker Gill (SE01256057), Thorpe.



10 MM.

PHOTO 88.

Monocraterion -- side view of sub-vertical tubes. Note the down-ward deflection of the host rock laminae. Specimen 106. Waterfall Gill (SD98545679), Rylstone Fell.

PHOTO 89.

Monocraterion -- parting plane showing the concentration of carbonaceous matter around each vertical burrow. Facies 4, Parallel bedded and striped siltstone. Specimen 105. Waterfall Gill (SD98545679), Rylstone Fell.


105

PHOTO 90.

Monocraterion -- side view showing the upward passage of the vertical tubes into the funnels (dashed). Specimen 265. Lowburn Gill (SD99365527), Embsay Fell.

PHOTO 91.

Monocraterion -- side view of regularly spaced vertical tubes. Specimen 264. Lowburn Gill (SD99365527), Embsay Fell.

30 MM.

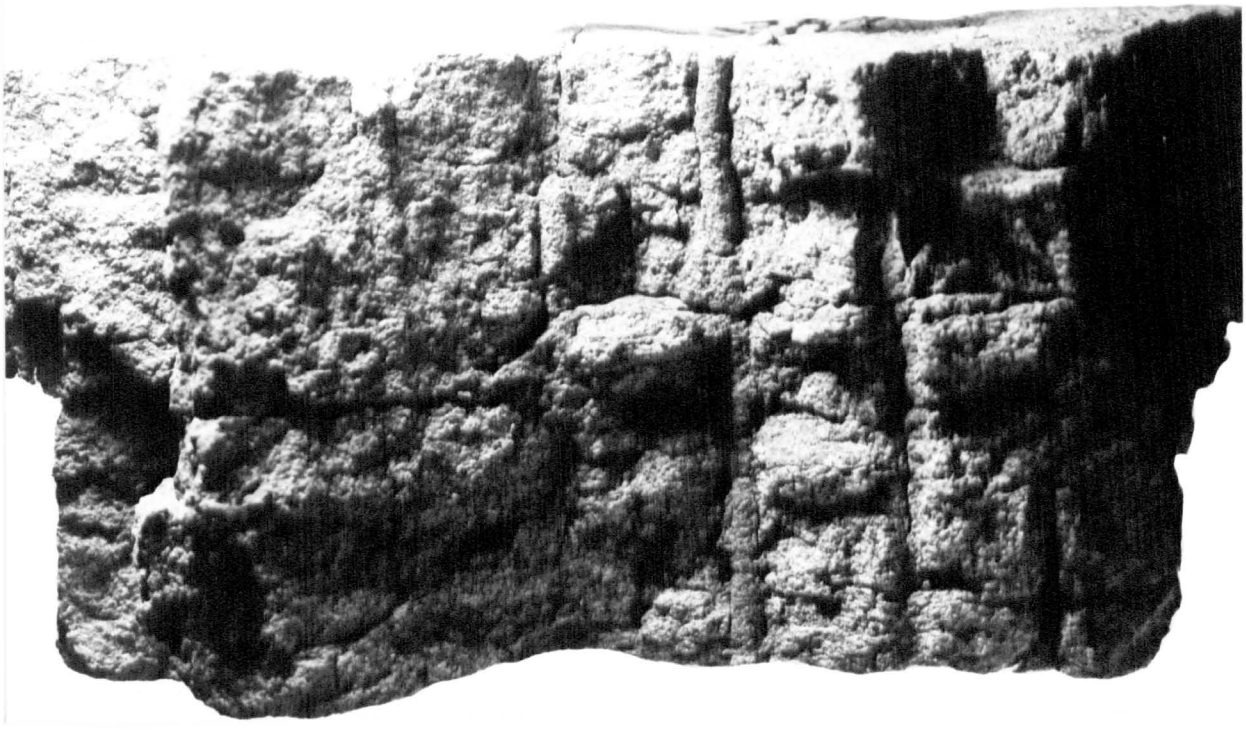
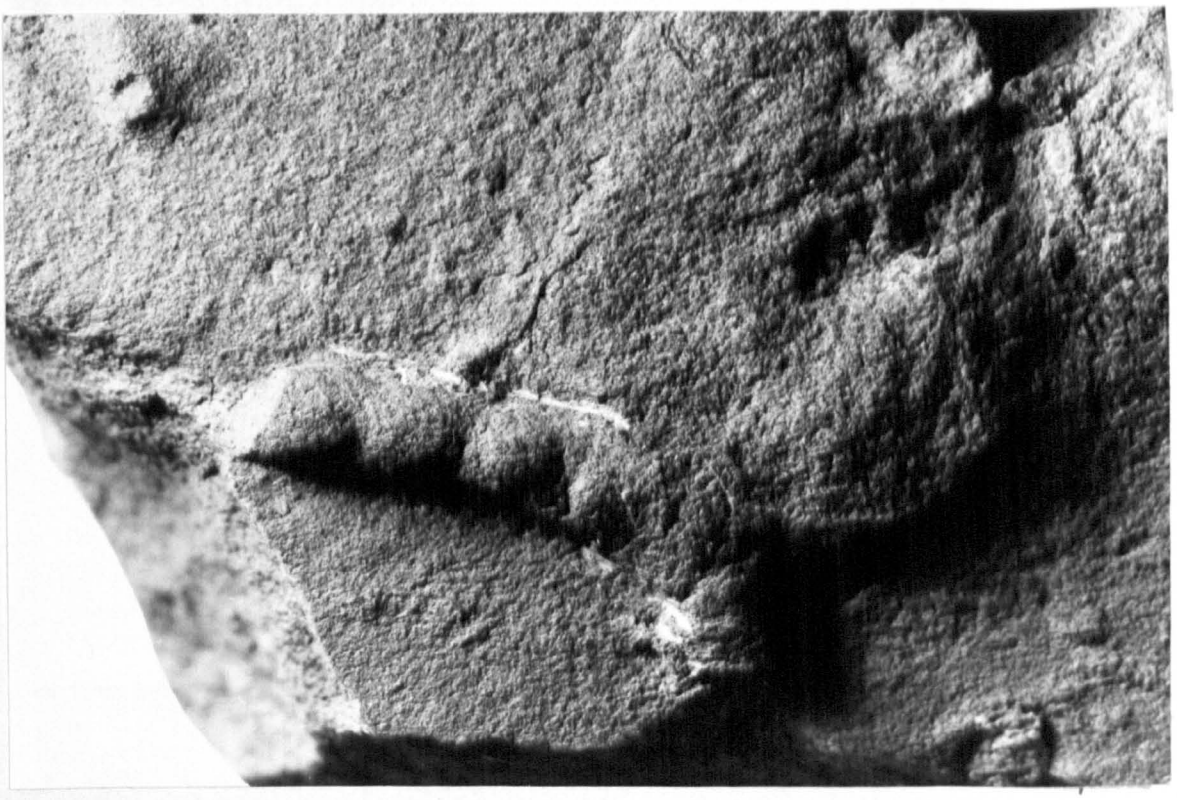


PHOTO 92.

Muensteria -- positive hyporelief on the sole ofafacies 6, Thin turbidite sandstone. Turbidite Association. Specimen 96. Catlow Gill (SD96204913), Carleton.

PHOTO 93.

Palaeophycus -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 156. Catlow Gill (SD968495), Carleton.


5 MM

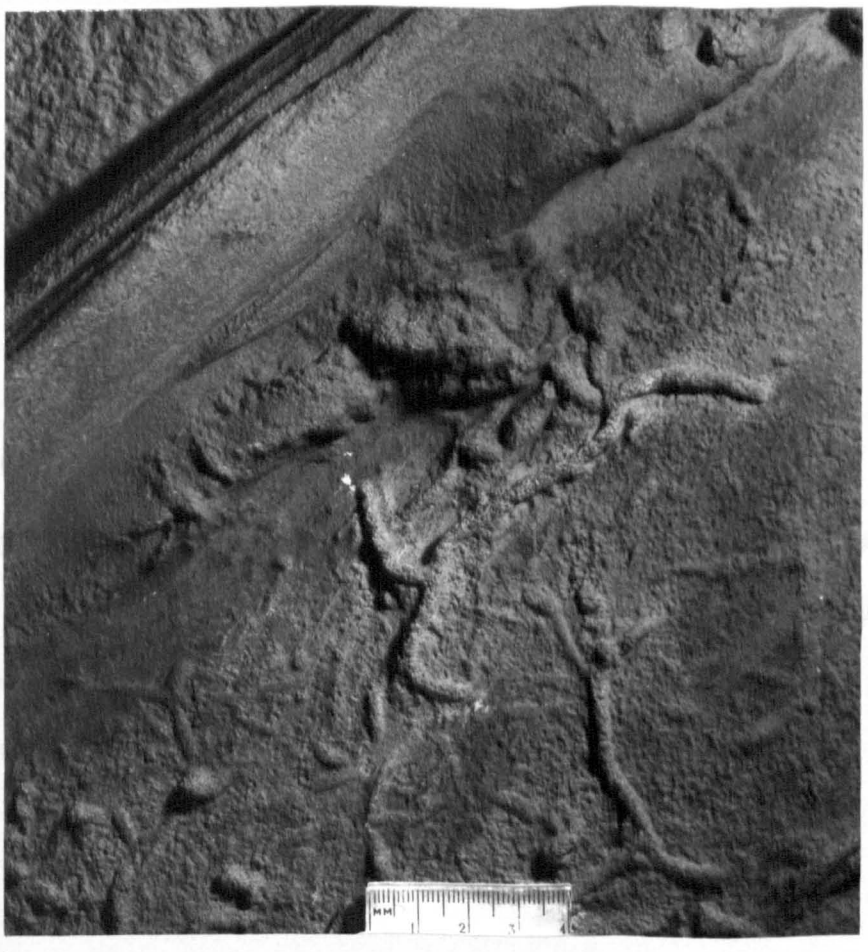
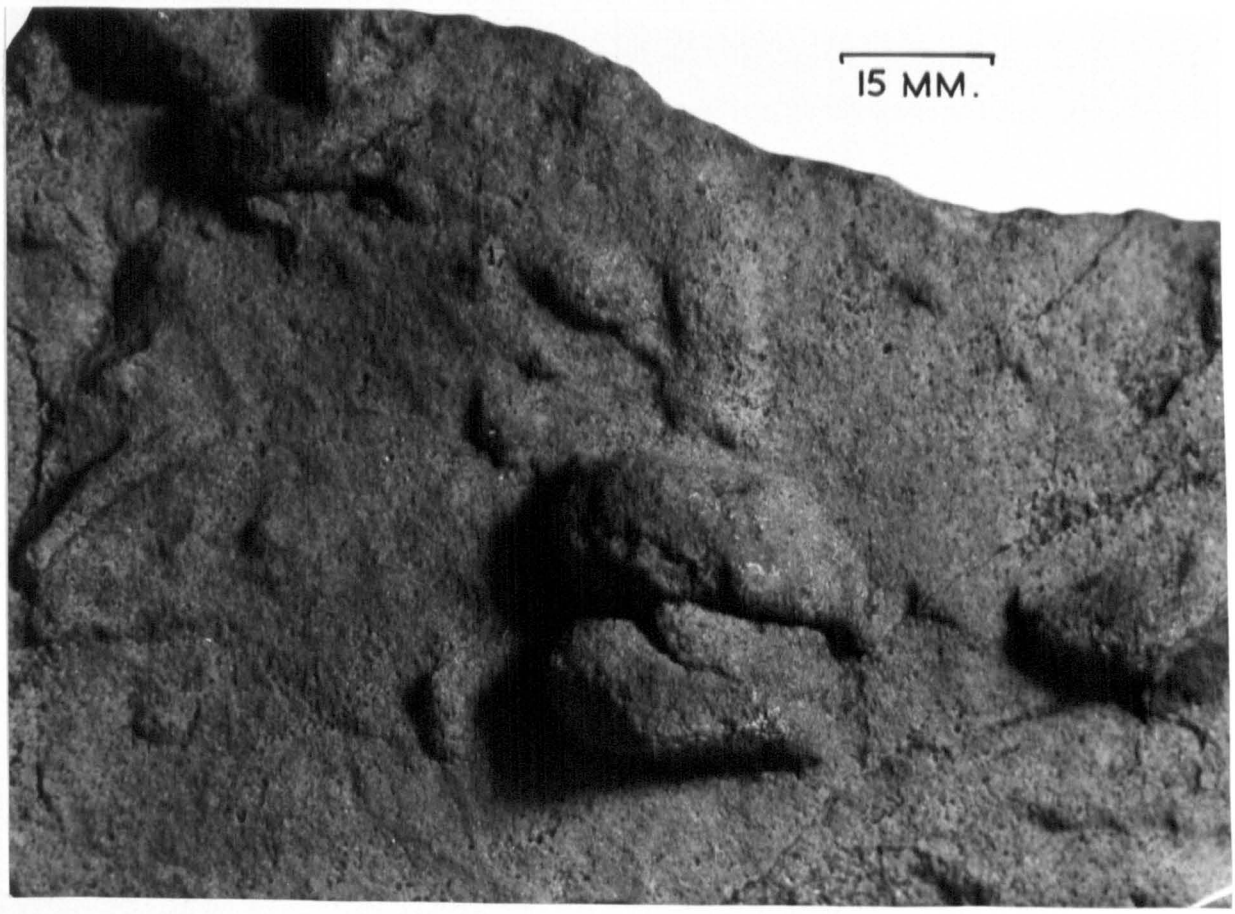


PHOTO 94.

Pelecypodichnus -- positive hyporelief on the sole of a facies 8, Parallel bedded sandstone. Top of the Slope Association. Specimen 99. Gas Pipe-line Trench. The Standard (SE00675022), Skipton Moor.

PHOTO 95.

Planolites -- negative epireliefs on bow-shaped linguoid ripples. Facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 84. Cawder Gill (SE00025019), Skipton Moor.


15 MM.

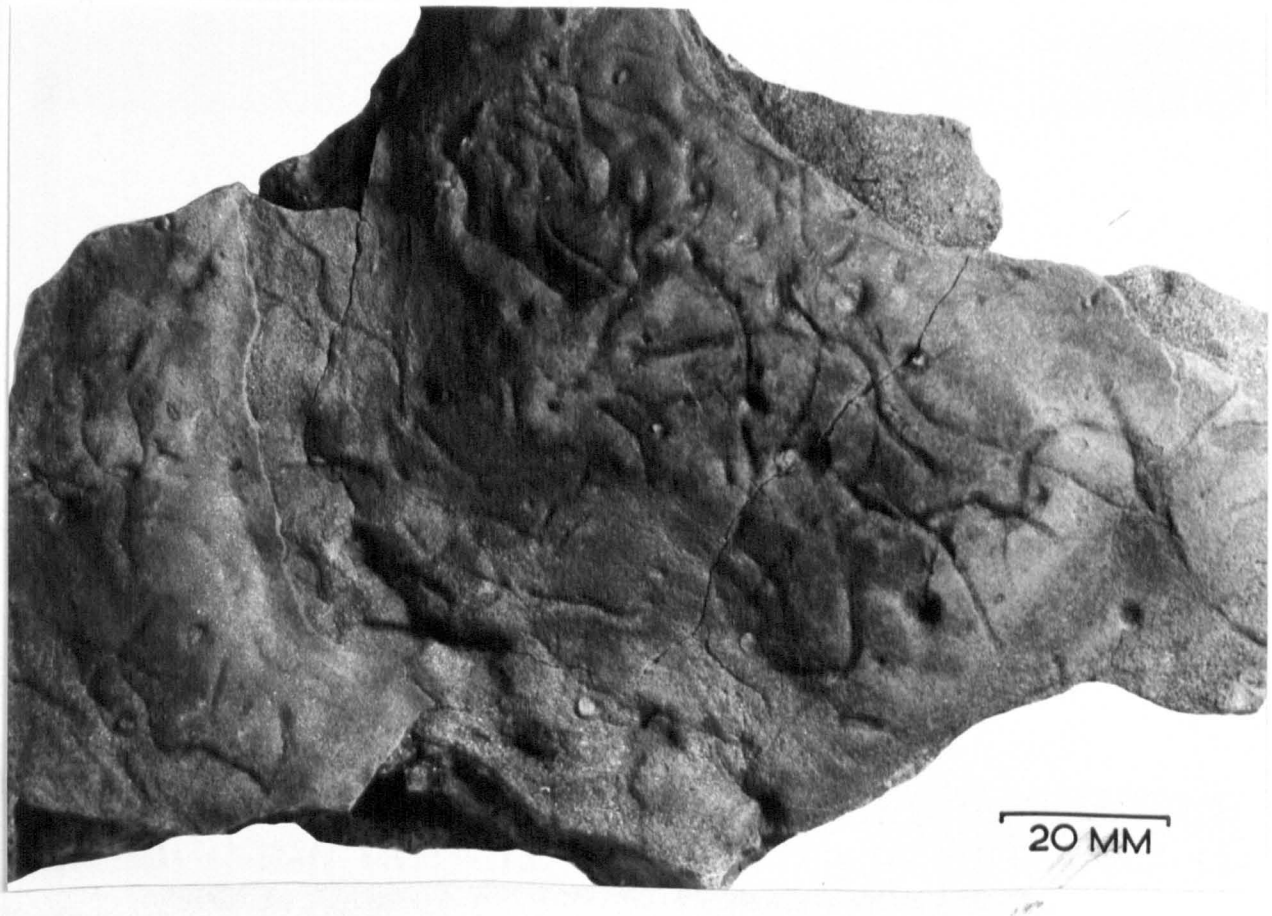

20 MM

PHOTO 96.

Planolites -- positive hyporeliefs on the sole of a facies 6, Thin turbidite sandstone. Turbidite Association. Specimen 85. Cawder Gill (SE00025019), Skipton Moor.

PHOTO 97.

Protopalaeodictyon -- positive hyporelief on the sole of a facies 6, Thin turbidite sandstone. Specimen 167. Bareshaw Beck (SD981484), Carleton.


20 MM

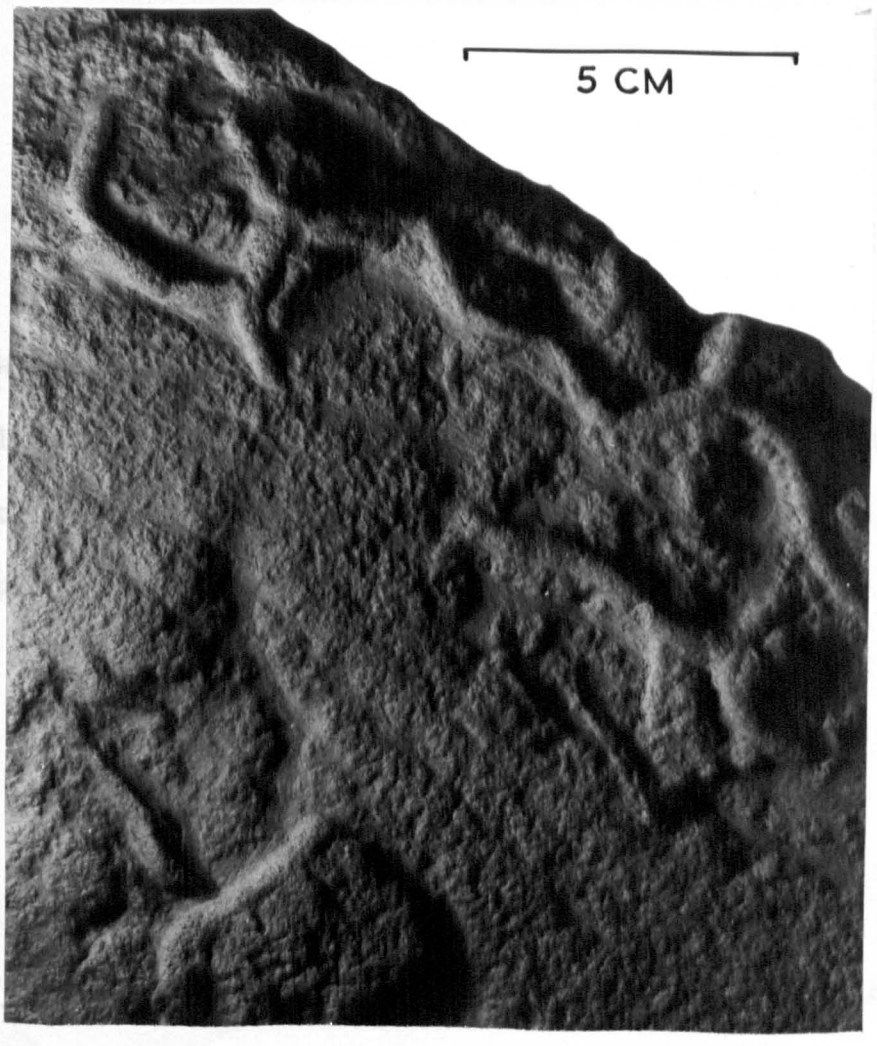

5 CM

PHOTO 98.

Rhizocorallium positive epirelief on linguoid rippled top of a facies 6, Thin turbidite sandstone. Trail is 80cm long. Lower part of the Slope Association.

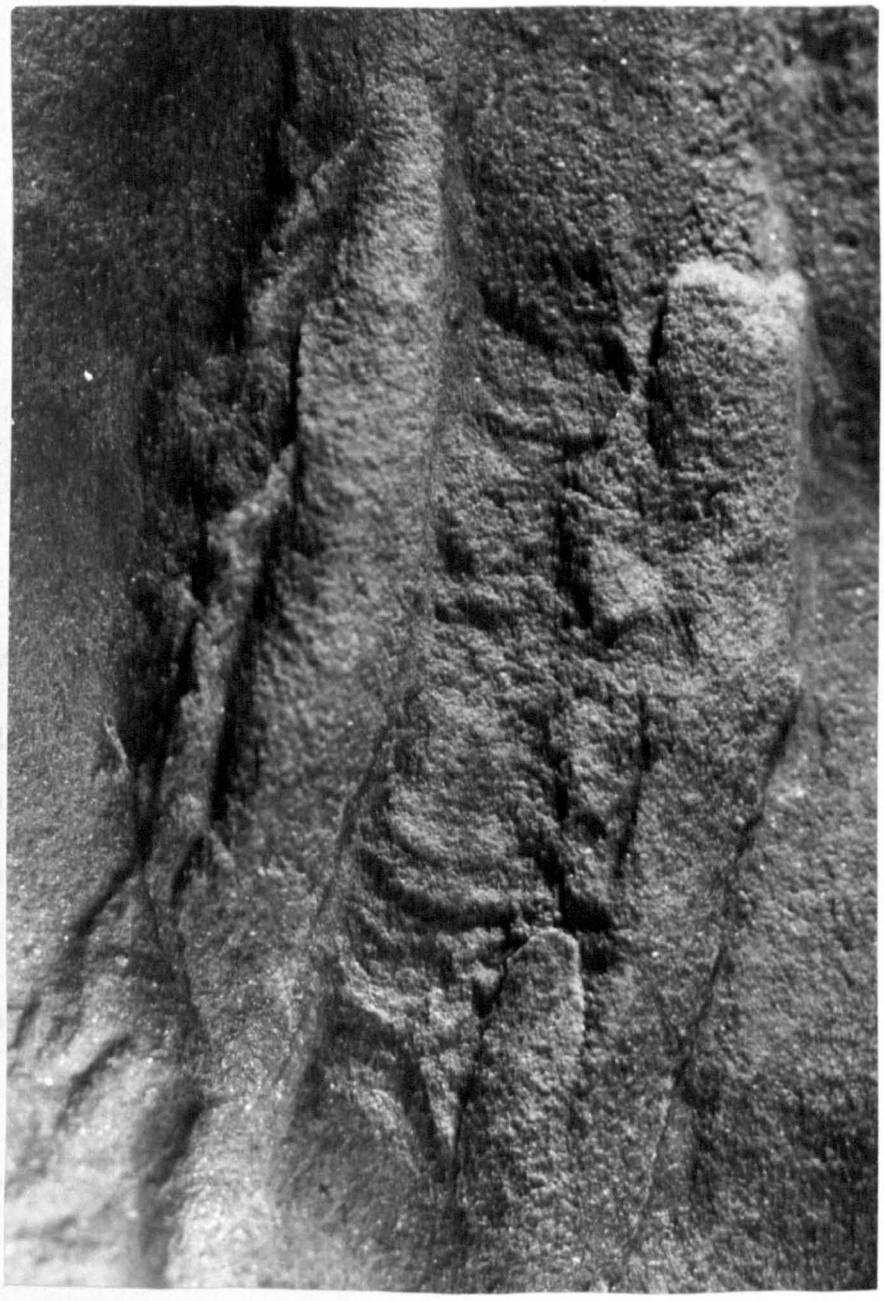
Specimen 67. Bareshaw Beck (SD98014843), Carleton.

PHOTO 99.

Close up detail of the Rhizocorallium featured in Photo 98. Compare this photograph with Photo 101, 102 and 103.

Specimen 67. Bareshaw Beck (SD98014843), Carleton.

20 CM



6 MM

PHOTO 100.

Rhizocorallium -- an epirelief trail with partial preservation of the lateral tubes. Specimen 83. Bareshaw Beck (SD98014843), Carleton.

PHOTO 101.

Rhizocorallium showing concavo-convex spreite between parallel outer tubes. See also Fig. 59a. Specimen from the E_{1C} of the Staffordshire basin. Collected by Nigel Trewin (Aberdeen Univ) who gave permission to reproduce photos 101, 102 and 103.


MM
1
2
3
4


5cm.

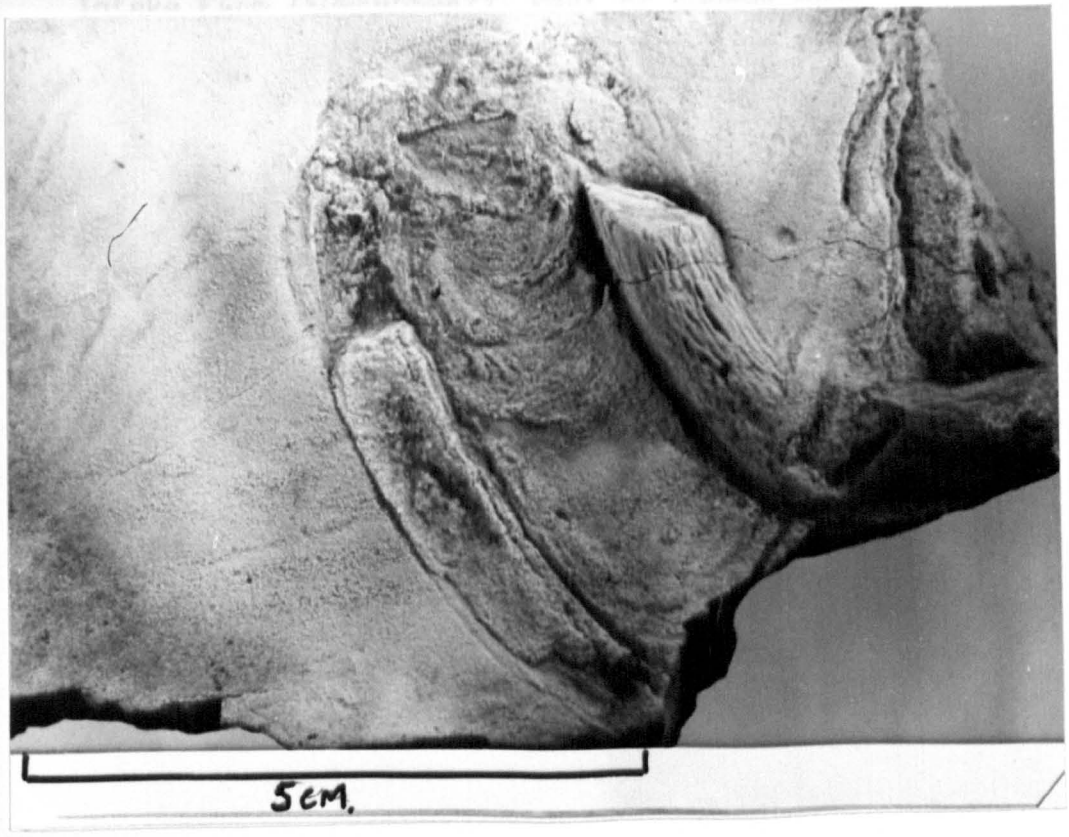
PHOTO 102.

Rhizocorallium. Collected by Nigel Trewin.

PHOTO 103.

Rhizocorallium, showing scratch marks on the lateral tubes. Collected by Nigel Trewin.


5 CM.


5CM.

PHOTOS 104, 105 AND 106.

Detailed close-ups of small rectilinear shaped Rhizocorallium positive epireliefs on facies 6, Thin turbidite sandstones. From specimens 263 and 262 (Photos 108 and 109 respectively). New Intake Farm (SD98955442), west of Embsay Moor Reservoir.

MM

MM

MM

PHOTO 107.

Globose shaped Rhizocorallium positive epirelief.

Specimen 263 (Photo 108). New Intake Farm.

PHOTO 108.

Facies 6, Thin turbidite sandstone with bow-shaped linguoid ripples showing randomly orientated Rhizocorallium positive epireliefs. Turbidite Association. Specimen 263. New Intake Farm (SD98955442), Embsay.


MM
1
2
3

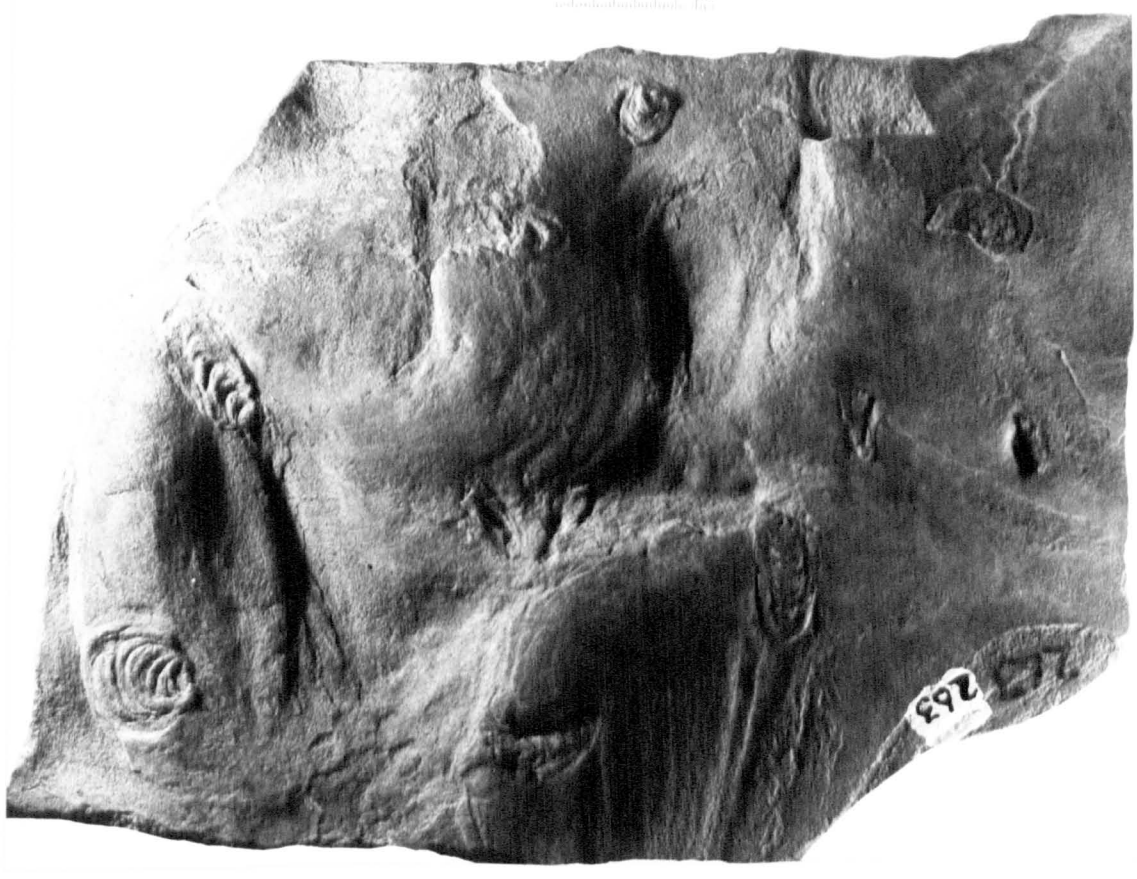

263

PHOTO 109.

Facies 6, Thin turbidite sandstone with bow-shaped linguoid rippled top showing randomly orientated Rhizocorallium positive epireliefs. Turbidite Association. Specimen 262. New Intake Farm (SD98955442), Embsay.

PHOTO 110.

Parting plane full relief of ?Scalarituba. A vague indication of internal organisation can be seen under certain lighting conditions, compare with Fig. 66. Junction of the Slope and Turbidite Association. Cawder Gill (SE00535041), Skipton Moor.


262

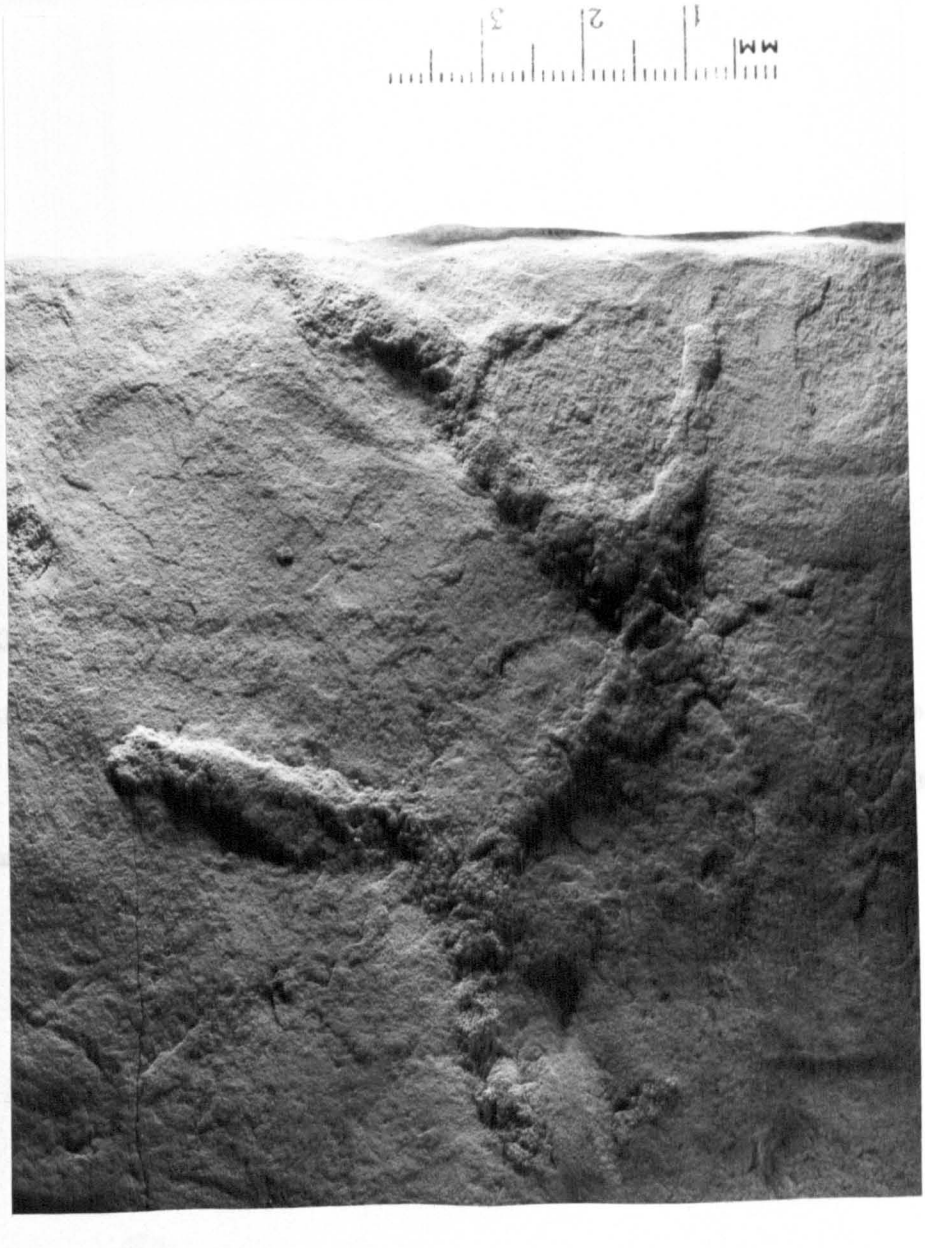


PHOTO 111.

Facies 11, Large scale cross-bedded sandstone foreset laminae showing negative epirelief preservation of ?Spirophycus (left of car keys) and Cochlichnus (right). Delta Top Association. Specimen not collected, photographed in situ. Halton Height (SE03405522), Halton Moor.

PHOTO 112.

Brush or scrabble mark preserved on the top of a facies 6, Thin turbidite. Turbidite Association. Specimen 200, Cawder Gill (SE00025019), Skipton Moor.


MM
1
2
3
4

PHOTO 113.

Brush or scrabble marks preserved as epireliefs on the top of facies 6, Thin turbidite sandstones. These structures may have been formed by an organism which also formed the Rhizocorallium burrows (see Fig. 66). Lower part of the Slope Association. Specimen 166. Bareshaw Beck (SD981484), Carleton.

PHOTO 114.

Brush or scrabble mark preserved as an epirelief on a facies 6, Thin turbidite sandstone. Turbidite Association.

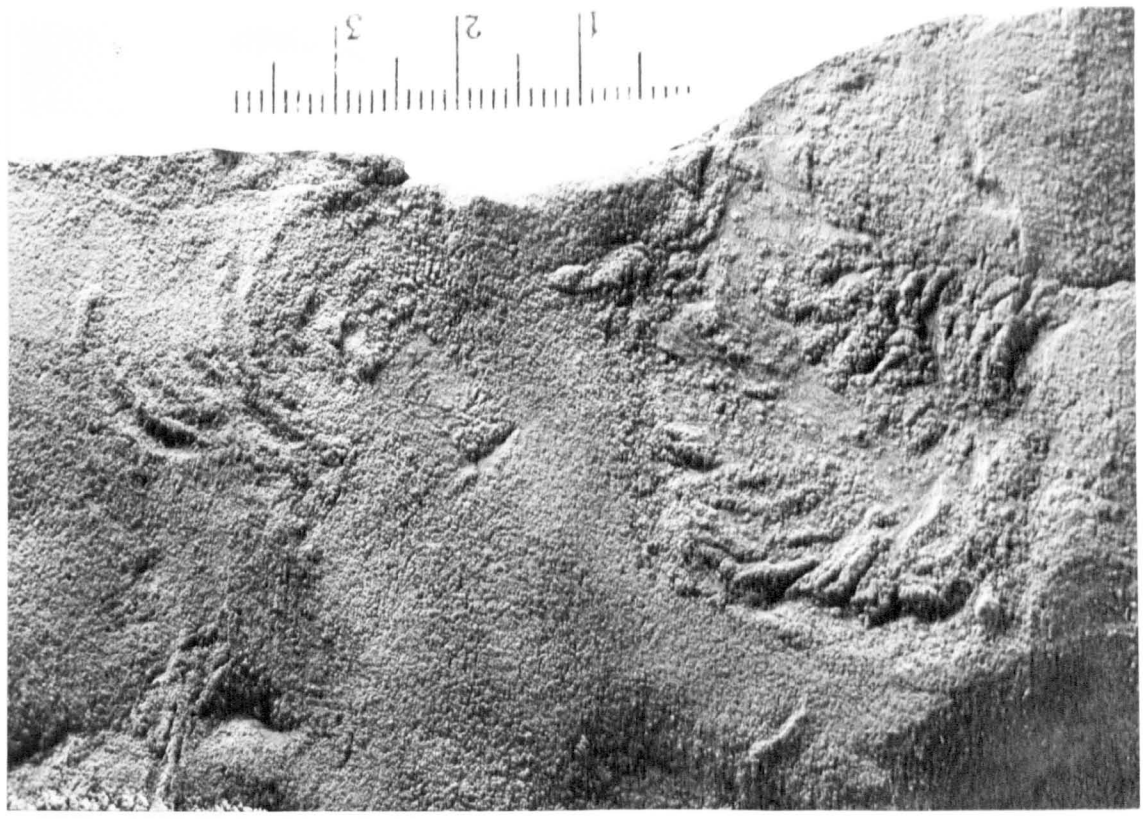


PHOTO 115.

Crescent scours preserved as hyporeliefs on the sole of facies 6, Thin turbidite sandstones. The scour was probably made round a resistant projecting vertical burrow. Flow of current was from top to bottom. White numbered square is a approximately 20mm wide. Specimen 150. Bareshaw Beck (SD981484), Carleton.

PHOTO 116.

Facies D, Sinuous crested symmetrically rippled sandstones (Type A). (See Fig. 74). Bradley Flags High Edge Beck (SE025500), Skipton Moor.

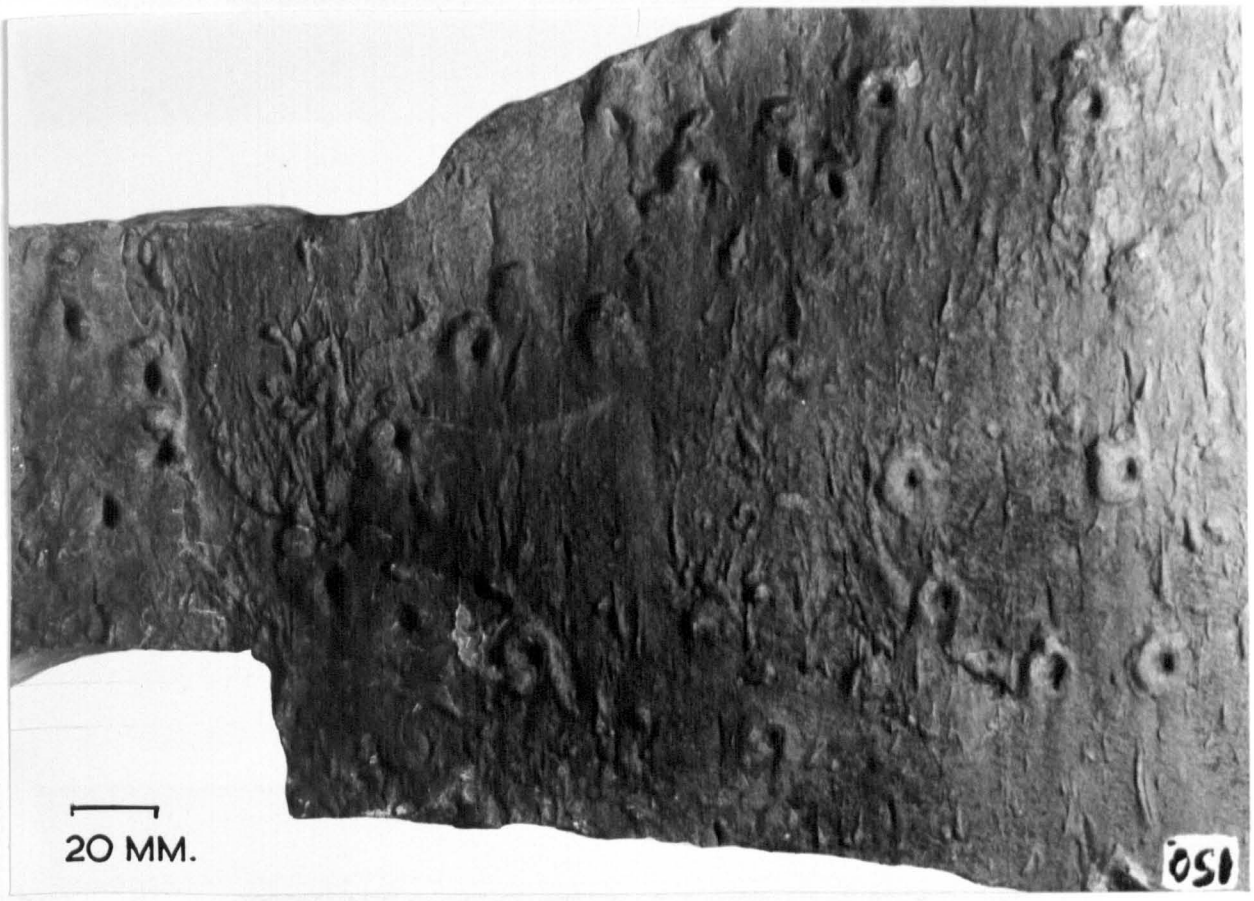

20 MM.
051

PHOTO 117.

Slab of Facies D, Sinuous crested symmetrically rippled sandstone (Type B) showing secondary crests (indicated by arrows). Note also the Pelecypodichnus elliptical pits. Bradley Flags. Specimen 233. High Edge (SE025500), Skipton Moor.

PHOTO 118.

Cochlichnus preserved as a parting plane full relief on Facies D, Sinuous crested symmetrically rippled sandstone. Bradley Flags. Trail 45mm long. High Edge (SE025500), Skipton Moor.

PHOTO 119.

Facies F, Medium to large scale ?Kappa cross-bedded sandstones, overlain by Facies G, Parallel laminated sandstones. In the cross bedded cosets, note the preservation of topset laminae. Also note the complete lack of large pebbles. Hammer (centre bottom) for a scale). Bradley Flags. Low Bradley Quarry (SE002489), Bradley.

PHOTO 120.

Negative epirelief of Nereis diversicolor, a meandering surface trail. Note that one of the trails terminates in an elliptical depression (centre right), Specimen is 55cm long and 25cm wide. Loose block, Eller Gill (SE00924947), High Bradley. Bradley Flags.

PHOTO 121.

Epirelief meandering trail on emergent intertidal bar. Tana River, Finnmark. Trail made by errent Polychaete, slowly browsing and feeding across the bar top. Compare with Photo 120 above.


113.

Enclosure A

Enclosure A

01 02 03

0 500 1000 1500 2000
METRES

HIGH ALLOTMENT

HOWGILL NICK

GREEN HILL PASTURE

DOWNS PASTURE

DEEP CUT

68 67 66 65 64

19 6 9 5 21 10 10 7 14 10 4 5 7 5 10 14 7 5 9 7 12 4 23

COAL GROVE BECK

YARNBURY

YARNBURY FAULT

SAND HAW

BOLTON GILL

BLACK HILL MOSS

KNOTS TOP

BOLTON HAW END

SPRING HOUSE

EDGE TOP

PICKERING END HOUSE

HEBDEN BECK

EDGE MOSS

BRISTA GILL RIDGE

DUMPIT HILL FLAT

STONE GILL SIKE

STANDARD SIDE

TOWN HILL

North Craven Fault System

JOINS AREA B.

RED SCAR GRITS

NIDDERDALE SHALE

GRASSINGTON GRITS

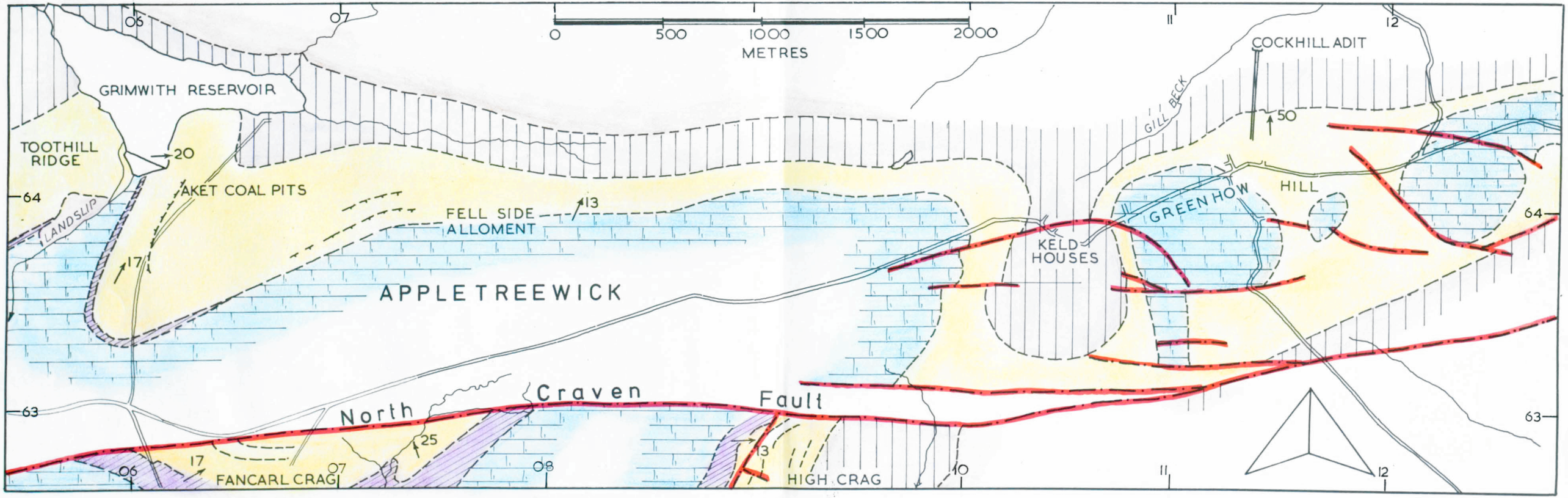
BOWLAND SHALE

LOWER CARBONIFEROUS LIMESTONES

FAULTS

6 DIP OF STRATA. THE ANGLE IN DEGREES.

Enclosure B


0
500
1000
1500
2000
METRES
06
07
11
12
GRIMWITH RESERVOIR
COCKHILL ADIT
GILL BECK
TOOTHILL RIDGE
20
50
64
LANDSLIP
AKET COAL PITS
FELL SIDE ALLOMENT
13
GREEN HOW
HILL
17
KELD HOUSES
APPLETREEWICK
63
North Craven Fault
25
13
FANCARL CRAG
08
HIGH CRAG
10

Enclosure C

63 06 07 08 JOINS AREA B. 10 11 63

North Craven Fault

BLACK HILL

HIGH CRAGS

FANCARL CRAG

CATHERINE OR KATTY WHITES ALLOTMENTS

APPLETREEWICK PASTURE

SKYREHOLME BECK

GREEN GROOVES

62 Skyreholme Anticline 62

BLOW TARN

TROLLERS GILL

SKYREHOLME

ROCHARD RIGG

ROCHARD CRAG

Rochard Sike

ELLER EDGE

NAR HILL FAULT

61 WHITHILL 61

MIDDLE SKYREHOLME

BLANDS BECK

Redlish Syncline

POCKSTONE HEN STONES

P O C K S T O N E S

GREAT POCKSTONES

M O O R

Appletreewick

SKYREHOLME

Simon Seat Anticline

60 NOT MAPPED IN DETAIL 60

FIR BECK

UPPER FELL PLANTATION

SIMONS SEAT

LORDS SEAT

BLACK CRAG

HENSTONES

HARDEN FAULT

boundary is very conjectural

TRUCKLE CRAGS

GREAT AGILL HEAD

59 R. WHARFE 59

LONG CRAG

LOWER FELL PLANTATION

B A R D E N F E L L

CARNCLIFF TOP

58 58

HUDSON GILL

0 500 1000 1500 2000 METRES

06 07 08 09

ALLUVIUM

LANDSLIPS

RED SCAR GRIT

NIDDERDALE SHALES LOWER HARDEN SHALES

GRASSINGTON GRITS

COARSE PEBBLY SANDSTONE

FINE/MEDIUM SANDSTONE

BOWLAND SHALES

LOWER CARBONIFEROUS LIMESTONES

FAULTS

SYNCLINE

ANTICLINE

Enclosure D

Enclosure D

SWINDEN
61
Hetton Anticline
THREAPLAND
CARDEN
STEBDEN HILL
LANDSLIP
LANDSLIP
KAIL
HESKER GILL
LANDSLIP
WATERS OUT BECK
ROLLING GATE CRAG
THREAPLAND FELL
THREAPLAND
SKELTERTON
60
7
17
20
22
35
27
20
BARTLE CRAGS
NUMBERSTONES END
SHOOTING HO.
BURNSALL & THORPE FELL
COAL PITS
THORPE FELL TOP
ONIONHILL
THREE THORN WELL
THE CRAGS
PETERS CRAG
GILL
CRACOE FELL
CRACOE PEAT PITS
BURNSALL PEAT PITS
LAND SLIP
59
BROWNSHAW
OBELISK
POTTERS GAP
20
20
40
CRUTCHING CLOSE LAITHE
41
23
36
FELL GILL
58
BARK BROW
39
RYLSTONE FELL
STONE MAN
BLACK SIKE
OLD COAL PITS
HIGH BARK
57
NORTON TOWER
WATERFALL
WATER FALL BECK
SUN MOOR WOOD
10
9
15
5
5
HELLIFIELD CRAGS
WINTERBURN–EMBSAY
NETTLE HOLE RIDGE
FAIRIES CHEST
CROOKRISE CRAG
HARTS HILLS FLAT
OLD COAL PITS
DEER GALLOWS
RAMS GILL HEAD
RED GILL
56
CROOKRISE WOOD
13
LANDSLIP
HIGH EDGE
LOWBURN
ELLER BECK
HOLLIN WOOD
55
BRASS CASTLE
STONYCLIFF BROW
MOOR BECK
15
17
30
EMBSAY CRAG
EASTBY GATE
22
24
EASTBY CRAG
HIGH MARK
EMBSAY MOOR RES.
31
25
HEUGH GILL
EASTBY
25
FLATES BARN
98
99
INTAKE FARM
00
01
02

0 500 1000 1500 2000 2500 METRES

GRASSINGTON GRIT
- Fine grained sediments
- Medium scale cross bedding
- Large scale cross bedding

PENDLE SHALE
- Coarse Massive sst.
- Mudstones & siltstones

PENDLE GRIT
- Ropy Weathering sst.
- Composite sandstones
- Mudstones siltstones & thin turbidites

- Landslips
- Bowland Shale
- Lower Carboniferous Limestone
- Reef Limestone
- Faults
- 5 Dip of strata. The angle in degrees
- Coal

Embsay Syncline

Enclosure E

COAL

GRASSINGTON GRIT

PENDLE GRIT & SHALE (undifferentiated)

BOWLAND SHALES

LOWER CARBONIFEROUS LIMESTONES

REEF LIMESTONES

SCALE

0 50 100 150 200 250 300

METRES

BORDLEY

North Craven Fault

HEIGHT LAITHE

LEE GATE HOUSE

NEW HOUSES FAULT

MOOR CLOSE GILL

BORDLEY HALL

ELLIS GILL

SKYTHORNS

BRACKEN POT GILL

Mid Craven Fault

HOG HOW SIKE

WEETS TOP

WEDBER

THRESHFIELD MOOR

GRAYSDALE BECK

KNOW BANK

Threshfield Syncline

DOLMIRE HILL

OLD COAL MINES

HANLITH GILL

HAMERTON HILL SIKE

BACKSTONE EDGE

LINTON MOOR FAULT

LINTON MOOR

ELLER BECK

CALTON MOOR

CAPTAIN MOOR

BLACK PARK

BOSS MOOR LANE

SWINDEN HILL

WINTER BURN RESERVOIR.

ADAPTED FROM THE GEOLOGICAL MAP OF I.A.WILLIAMSON. 1960.

Enclosure F

Enclosure F

GRASSINGTON GRIT
PENDLE SHALE
PENDLE GRIT

MEDIUM SCALE CROSS BEDDING
FINE GRAINED DEPOSITS
COARSE MASSIVE SANDSTONE
MUDSTONES & SILTSTONES
ROPY WEATHERING SANDSTONE
MUDSTONES, SILTSTONES & THIN TURBIDITES
COMPOSITE SANDSTONES

0 500 1000 1500 2000
METRES

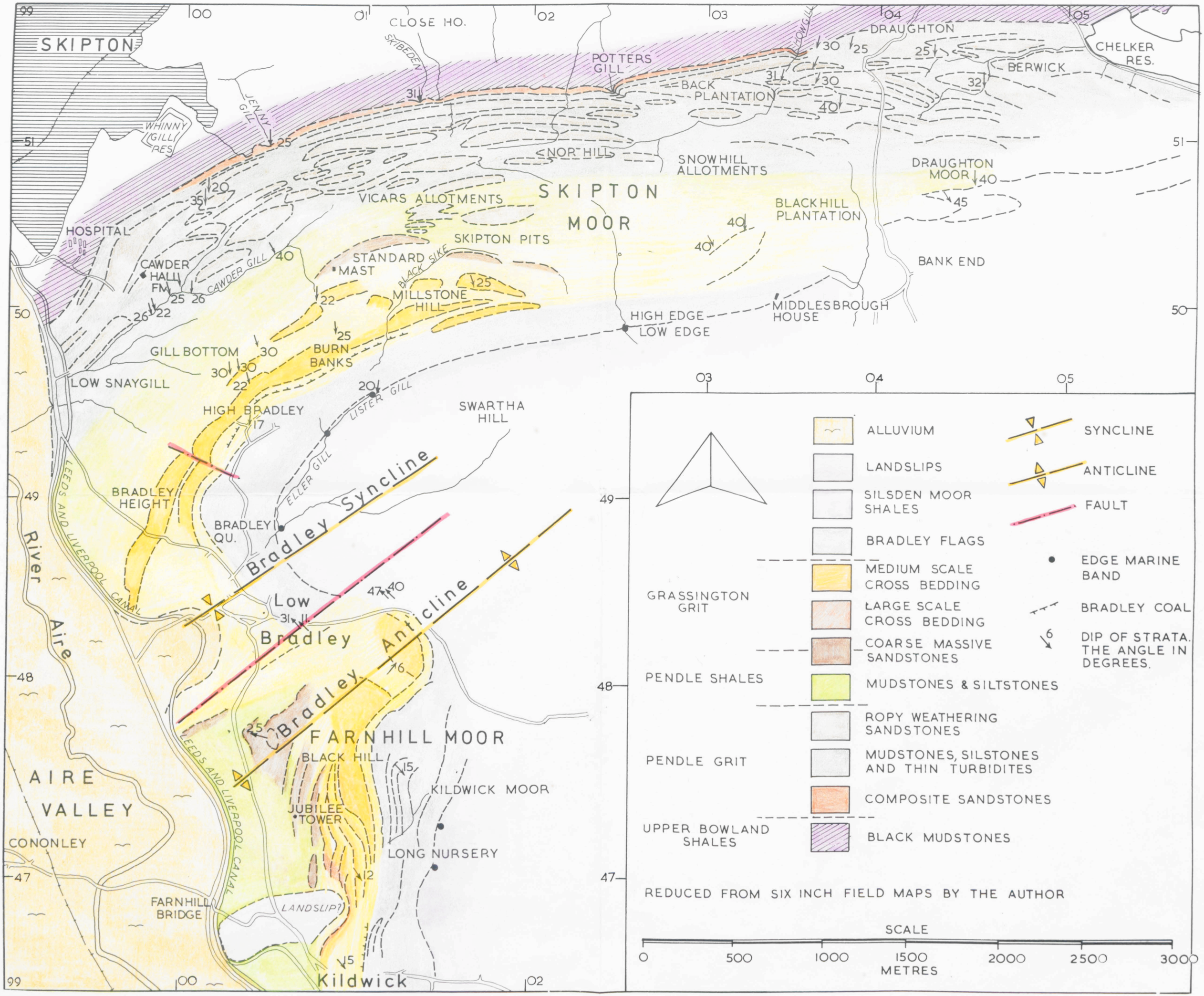
ALLUVIUM
LANDSLIP
SILSDEN MOOR SHALES
BOWLAND SHALES
SYNCLINE
ANTICLINE
FAULT
7 DIP OF STRATA

NOT MAPPED IN DETAIL

GREAT AGILL BOTTOM
HUDSON BECK
VALLEY OF DESOLATION
NORTH NAB
SOUTH NAB
THE STRID
STRID WOOD
LAUND HO
HAZELWOOD MOOR
ABBEY FAULT
PICKLES GILL
NOSKA BROW
PIKE STONES
STEAD DIKE
BOLTON ABBEY FAULT
PICKLES BECK
SKIPTON ANTICLINE
Whitmoor Syncline
CAT CRAGS
STORITHS
SKIPHOUSE WHEELSCAR
EDGE TOP
BOLTON ABBEY
LANDSLIP
BEAMSLEY MOOR
DISUSED RAILWAY LINE
HAMBLETON BECK
DEVONSHIRE ARMS HOTEL
KEX BECK
HOWGILL SIKE
GREY STONES
Beamsley Anticline
BOLTON BRIDGE
HARRY WALL GILL
HAW PIKE
R. WHARFE
BEAMSLEY
BEAMSLEY FAULT
BEAMSLEY BEACON
LANGBAR MOOR
HOW PIKE
ELLER CARR WOOD
DRAUGHTON
THURSTONES BECK
BLACK HILL
BLACK HILL HOUSE
HEALD WOOD
FARFIELD HALL
CHELKER RES.

Enclosure G

Enclosure G



ALLUVIUM

LANDSLIPS

SILSDEN MOOR SHALES

BRADLEY FLAGS

GRASSINGTON GRIT
- MEDIUM SCALE CROSS BEDDING
- LARGE SCALE CROSS BEDDING
- COARSE MASSIVE SANDSTONES

PENDLE SHALES
- MUDSTONES & SILTSTONES
- ROPY WEATHERING SANDSTONES

PENDLE GRIT
- MUDSTONES, SILSTONES AND THIN TURBIDITES
- COMPOSITE SANDSTONES

UPPER BOWLAND SHALES
- BLACK MUDSTONES

SYNCLINE

ANTICLINE

FAULT

EDGE MARINE BAND

BRADLEY COAL

6 DIP OF STRATA. THE ANGLE IN DEGREES.

REDUCED FROM SIX INCH FIELD MAPS BY THE AUTHOR

SCALE

0 500 1000 1500 2000 2500 3000 METRES

Enclosure H.

Enclosure H.

95 96 97 98 99

Carleton

CAT GILL

YELLISON BECK

SIXPENNY SIKE

6 9 21

PARK HO.

CARLA BECK

River Aire

CATLOW GILL

26

LANE HEAD QUARRY

25

7

49

RUSHBANK HILL

20

Carleton Syncline

10

BOREHOLE

7

PARK GILL

27 31

29 26

THROSTLE NEST

CARLETON PARK

MANOR FARM

Carleton Anticline

40

39

RAMSHAW

37

BARESHAW BECK

GOTT HILL

23

19

48

48

55

CARLETON MOOR

PARK HEAD QUARRY

BURNT HILL

NOT MAPPED IN DETAIL

Lothersdale Anticline

PEAT GILL

27

21

23

TANHILL PITS

47

47

TOW TOP MOOR

HEN GILL

CONONLEY BECK

CONONLEY MOOR

Cononley

NOT MAPPED IN DETAIL

97 98

GIB SIDE

GREEN GILL

Lothersdale

46

46

20 12

LOTHERSDALE BECK

TOWN EDGE

WOOD HEAD

SURGILL BECK

95 SURGILL HEAD 96

THE LEGEND IS AS FOR THE SKIPTON MOOR GEOLOGICAL MAP.

METRES

0 500 1000 1500 2000

Enclosure I

A

DELTA TOP

DELTA PLATFORM

SLOPE ASSOCIATION

NORTH CRAVEN FAULT

SKIPTON ANTICLINE

COAL GROVE BECK

LINTON MOOR FAULT

HAMERTON HILL SIKE

THREAPLAND GILL

ST. PETERS CRAG

THE CRAGS

RYLSTONE STONE MAN

WATERFALL BECK

BROWNSHAW

CROOKRISE LAITHE

HIGH MARK

WITSHAW BANK

NOR HILL

TRIG. POINT

CAWDER GILL

JENNY GILL QUARRY

BRADLEY COAL

MILLSTONE HILL

STANDARD

SPEC 131

SPEC 202/203

SPEC 210/223

SPEC 224

SPEC 264

SPEC 232/233

C. malhamense

KM 0 1 2 3 4 5

ASKRIGG BLOCK

COCKHILL ADIT

GRASSINGTON

BURNSALL

TOP OF SECTION

BOTTOM OF SECTION

GREAT AGILL BECK

EMBSAY CRAG

STORITHS

HOWGILL SIKE

THURSTONES

BOLTON ABBEY

BEAMSLEY

SKIPTON

CARLETON

CONONLEY

FARNHILL MOOR

SILSDEN

ADDINGHAM

CENTRAL PENNINE BASIN

Trace Fossils

PELECYPODICHNUS

SKOLITHOS (MONOCRATERION)

? SCALARITUBA

LOPHOCTENIUM

COCHLICHNUS

CURVOLITHUS

RHIZOCORALLIUM

PLANOLITES

CRESCENT SCOURS

PROTO-PALAEODICTYON

MAMMILICHNUS? OR GYRODITYLITES

BERGAUERIA

Full Reliefs

Epireliefs

Hyporeliefs

16 — number of readings

readings grouped in 15° classes

A

A'

B

B'

16 BRADLEY COAL

18 BRADLEY COAL

MILLSTONE HILL

STANDARD

16

ASSOCIATION

17

TRIG. POINT

R HILL

17

18

20

FARNHILL TOWER

20

22

23

PEAT GILL

FIDDLERS HILL

GOTT HILL

SPEC. 202/203

SPEC 210/223

SPEC. 224

CAWDER GILL

SPEC 264

SPEC 150

SPEC 67

SOUTH CRAVEN FAULT

19

21

TURBIDITE ASSOCIATION

BUTLER HILL

JENNY GILL QUARRY

19

22

24 CARLA BECK

24

C. malhamense

25 COCKHILL LIMESTONE

COAL

COAL

25

COCKHILL ADIT

ADAPTED FROM DUNHAM & STUBBLEFIELD

NORTH CRAVEN FAULT

26 ROOTLETS

26

GREAT AGILL

27 WITCHEY

GILL BANK QUARRY

BACKSTONE CLIFFE

27

28

BEAMSLEY BEACON

HOWGILL SIKE

28

29

DEERSTONES

29

BEAMSLEY FAULT

31

THURSTONES BECK

31

30

KEX BECK

30

VERTICAL HEIGHT IN METRES.

550 500 450 400 350 300 250 200 150 100 50 40 30 20 10 0

Lithology (partially inferred)

Coal

Coarse and Pebbly Sandstone

Fine to Medium Sandstone

Siltstone

Mudstone

Sedimentary Structures (as observed)

Rootlets

Large scale Cross bedding

Medium scale Cross bedding

Massive weathering

Ropy weathering

Small scale and Micro Cross bedding

Composite bedding

Striped Parallel bedding

Mudstone with thin Turbidites

Parallel lamination

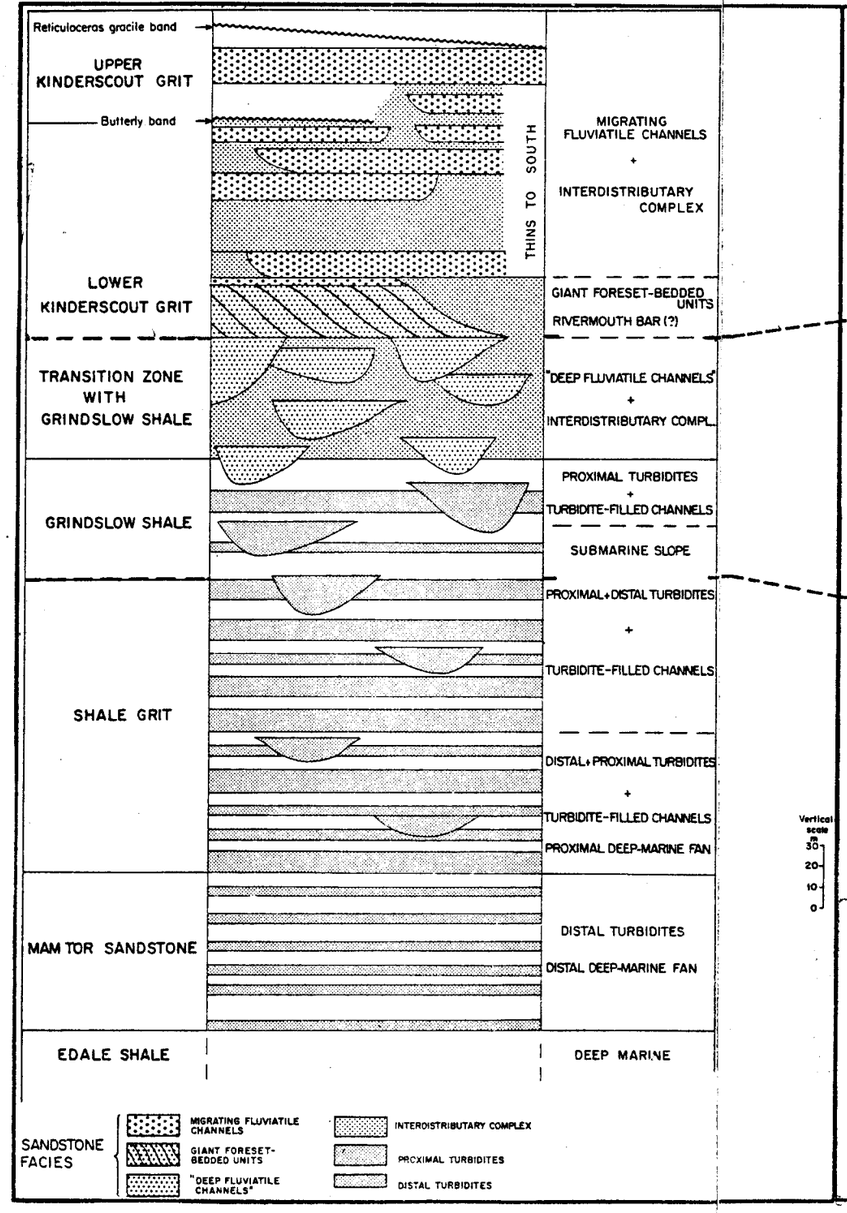
STRATIGRAPHY

Grassington Grit

Pendle Shale

Pendle Grit

Upper Bowland Shale



ASSEMBLAGE C : DELTA TOPSET

PEBBLY SANDSTONES; COSETS OF MEDIUM SCALE CROSS BEDS OF WIDE LATERAL EXTENT; CHANNELS WITH CROSS BED SETS UP TO 40m THICK AT THE BASE OF ASSEMBLAGE - DELTA DISTRIBUTARIES.

COARSENING AND FINING UPWARD SEQUENCES IN A CONTINUUM BETWEEN MUDROCK AND RIPPLED MEDIUM SANDSTONE - INTERDISTRIBUTARY BAY SEDIMENTS.

SEATEARTHS AND COALS - SWAMPS.

ASSEMBLAGE B : DELTA FORESET

OVERALL COARSENING UPWARD SEQUENCE BETWEEN MUDROCK AND RIPPLED COARSE SANDSTONE. EVIDENCE OF SLUMPING IN UPPER PART OF THE ASSEMBLAGE - MAIN DELTA SLOPE.

CHANNELS, UP TO 12m DEEP, INFILLED WITH VERY COARSE PEBBLY SANDSTONES; MAINLY UNLAMINATED BUT ALSO PARALLEL AND TROUGH CROSS LAMINATED - CHANNELS CUT AND FILLED BY TURBIDITY CURRENTS.

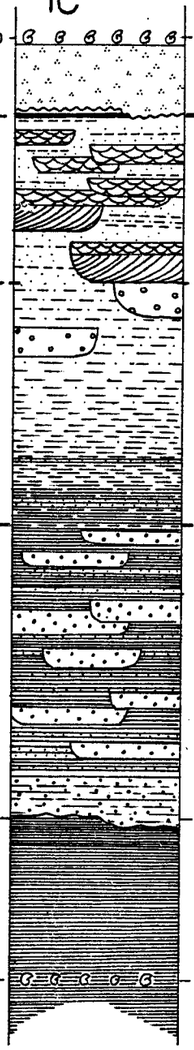
ASSEMBLAGE A : DELTA TOESET

TURBIDITE SANDSTONES BECOMING THICKER AND LESS PARALLEL SIDED UPWARDS. CHANNELS INFILLED WITH MASSIVE SANDSTONES OCCUR NEAR THE TOP OF THE ASSEMBLAGE - PROGRADING TURBIDITE FAN.

ABOVE — General succession and environmental interpretation proposed by McCabe (1975b)

LEFT — Composite section through the R_1 succession in North Derbyshire; after Collinson (1968, 1969 and 1970). (Diagram from Parker 1976 : Course on Clastic Sedimentation - Deep Sea Sands, ÷ Geol. Soc. Lond./ Pet. Ex. Soc. G.B.)

E_{1c} DELTA



HIGH E_{2a} MARINE BAND

BRADLEY FLAGS

BRADLEY COAL

BRADLEY COAL REPRESENTS THE ABANDONMENT PHASE OF THE E_{1c} DELTA

GRASSINGTON GRITS

DELTA TOP ASSOCIATION

DELTA TOP ASSOCIATION (up to 200 m)

DOMINATED BY CHANNEL BOUND COARSE FLUVIATILE SANDSTONES. DEEP CHANNELS WITH LARGE CROSS BEDS (av. 15m) TOWARDS BASE - DELTA DISTRIBUTARIES.

PENDLE SHALES

SLOPE ASSOCIATION

SLOPE ASSOCIATION (up to 340m)

COARSENING-UP SEQUENCE OF SILTSTONES AND FINE SANDSTONES. ALSO CUT BY FEEDER CHANNELS FILLED WITH COARSE "MASSIVE-WEATHERING" SANDSTONES - MAIN DELTA SLOPE.

PENDLE GRITS

TURBIDITE ASSOCIATION

TURBIDITE ASSOCIATION (up to 290 m)

CHARACTERISED BY FREQUENT INTERCALATIONS OF DARK MUDSTONE, THIN TURBIDITES AND THICK COMPOSITE SANDSTONES CUT BY LENTICULAR CHANNELS OF COARSE "ROPY- WEATHERING" SANDSTONES.

-TURBIDITE FAN COMPLEX WITH MULTIPLE FEEDER CHANNEL SYSTEM.

UPPER BOWLAND SHALES

C. malhamense M.B.

SEE FIGURE 72 (this thesis) FOR TRACE FOSSIL DISTRIBUTION.

ENCLOSURE J.