THE USE OF THE TERMS SHALE GRIT, FAREY'S GRIT AND YOREDALE GRIT IN THE NAMURIAN OF THE CENTRAL AND SOUTHERN PENNINES

by

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Summary

The history of the usage of the terms is discussed. The name "Grindsbrook Grit" is proposed to replace the term "Shale Grit".

Introduction

This paper gives an account of the use of certain stratigraphic terms for beds ranging in age from the uppermost part of the Lower Carboniferous Limestone (Visean, P2), through the lower part of the Millstone Grit Series to the Reticuloceras coreticulatum marine band just below the base of the Kinderscout Grit.

The term Shale Grit was introduced by Farey (1811). In 1864 Hull and Green introduced the term Yoredale Grit which they equated with the Shale Grit of Farey. Hind and Howe (1901) used a new term Farey's Grit, which was also equated with the Shale Grit of Farey. The introduction and historical use of these terms is discussed and it is suggested that the use of the term Shale Grit should be abandoned and that the name Grindsbrook Grit should be substituted.

Historical Discussion

In 1811 Farey's report on the agriculture of Derbyshire and neighbouring areas was published. In this report, the gritstone and shale strata which extend over much of Derbyshire and Staffordshire and which are now called the Millstone Grit Series, were discussed. Farey suggested (1811 p. 228) that the shales underlying the basal grit of the Millstone Grit Series were from 150-170 yards thick and later (ibid. p. 228) wrote:

> "This stratum is subject to great and curious anomalies; the first and most general of which are accidental beds of fine-grained siliceous freestone, very full of mica in minute plates and stained with different shades and shapes of yellow and red. This stone which I shall call the Shale-Freestone or Shale-Grit, from the circumstance of its always alternating with shale, forms the most beautiful and perfect Freestone" ..... etc.

On earlier pages (ibid. pp. 16-63) Farey listed the hills of Derbyshire and the bordering regions of neighbouring counties, together with their strata. This list includes such widely scattered points as Morredge (SK 023 570) and Gun Hill (SJ970 615) in Staffordshire, and Rushup Edge (SK110 830), Castle Top (SK311 567) south-east of Cromford and "near Shottle" (SK312 497) in Derbyshire (see Text-fig. 1). These hills were said by Farey to consist of Shale and Shale Grit. Farey also stated (ibid. pp. 228-229) that

> "In some places there are accidental beds of the Shale-stone of a canky hardness and very fit for road-making; the places where I have observed this kind of cank-stone are ....."

The list given by Farey includes Gun Moor and Grindon Moor (SK065 555) in North Staffordshire.

Thus we find that the areas of Morredge, Gun Hill and Grindon Moor, all in North Staffordshire are composed of Shale and Shale Grit. The strata outcropping on Grindon Moor are now known to be of Upper Visean (P2) age (Morris, 1966) and represent the eastward extension of the Onecote Sandstones (see Table 1) of Hudson (1945 p. 321). The sandstones outcropping on Morredge and Gun Hill are of Namurian (E1-E2) age and form the Crowstones and Thorncliff Sandstones of Hudson (1945 pp. 320-321). It has also been shown that in other localities mentioned by Farey (e.g. Rushup Edge and Castle Top, near Cromford) the "Shale Grit" beds are of Namurian (R1) age (Jackson 1927 p. 16; Fearnsides et al. 1932 p. 169; Bromehead et al. 1933 p. 13).

The term Shale Grit, as used by Farey, was not precisely defined. No precise locality of outcrop was given and no stratigraphical position was stated with reference to a faunal sequence; indeed, at that time such a sequence was unknown. Our more recent knowledge of faunal sequences, particularly of goniatites, in the Millstone Grit makes it clear that Farey was either equating beds of different ages as one, or that he was simply describing a type of lithology which occurred commonly in both Staffordshire and Derbyshire. At all events Farey's Shale Grit cannot be identified with any certainty.

Hull and Green were the first authors to attempt to restrict the use of the term Shale Grit. These authors (1864 p. 247) described the beds between the lowest (Millstone) Grit and the "Mountain Limestone" (i.e. Carboniferous Limestone Series) and suggested a threefold division (with bed A at the top of the succession) as follows:

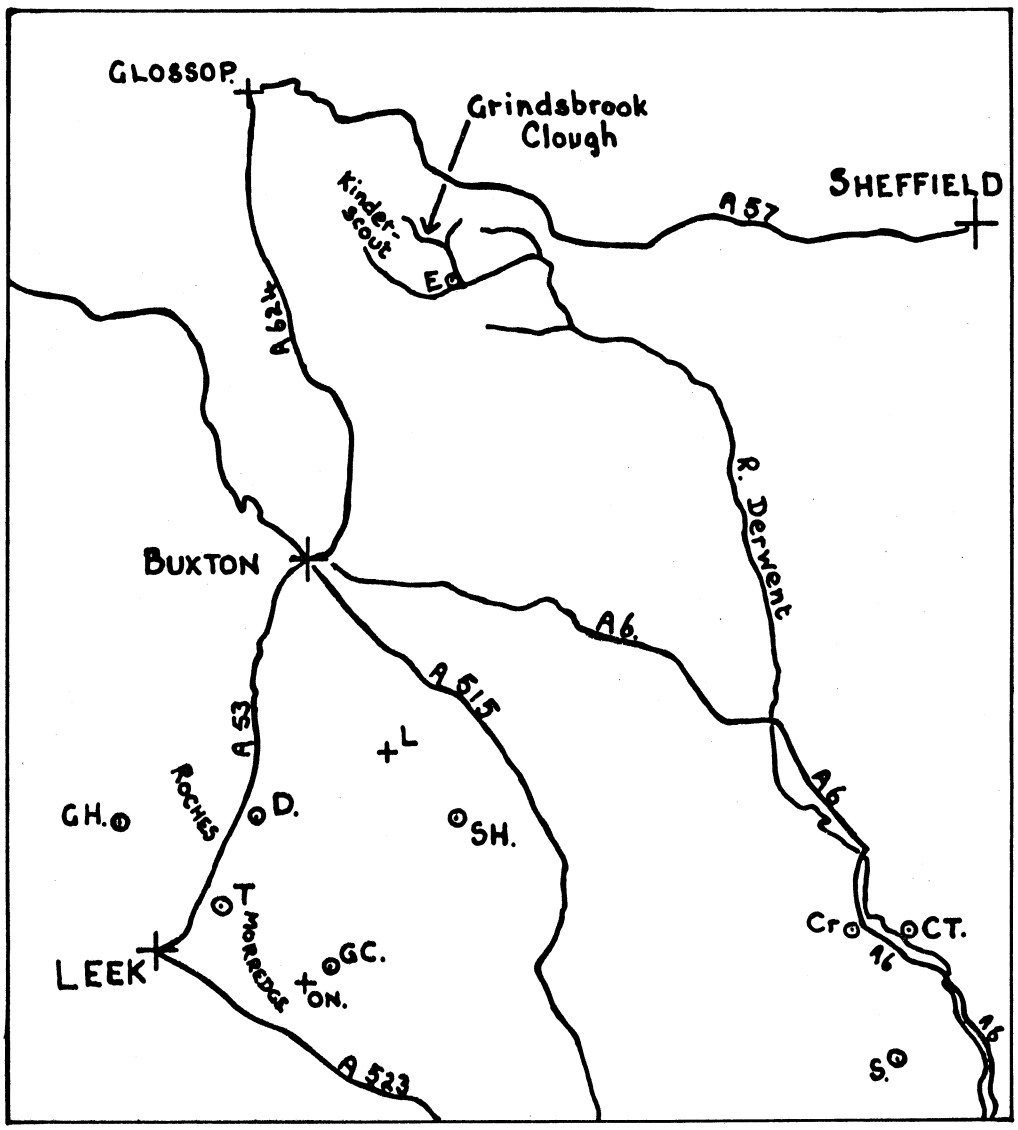
(A) Shales with a thick bed of sandstone (= Shale Grit of Farey) and perhaps a few thin limestones. This sandstone bed was re-named Yoredale Grit, since the group as a whole was referred to as the Yoredale rocks.

(B) Sandstones - mostly thin-bedded and close-grained with black shales. These beds were named the Yoredale Quartzite.

(C) Black shales with thin earthy limestones towards the base.

In a footnote (ibid. p. 247) Hull and Green stated that the three "Anomalies" described by Farey form the distinguishing features of the three main groups in the above scheme. Later (ibid. p. 263), the sequence at Mixon (SK 042573), near Leek, was given as follows:

Fig. 1. Map showing N. Derbys. and N. Staffs. localities mentioned in the text.



KEY:

C.T. = Castle Top, Cromford; D = Drystones; G = Gun Hill; G.C. = Grindon Common; L = Longnor; O = Onecote; S = Shottle; SH = Sheen Hill; T = Thorncliff; E = Edale; Cr = Cromford.

1.	Shales and a thick sandstone bed	A?	
2.	Shale		
3.	Coarse, quartzose conglomerate	)	
4.	Shales	)	B
5.	Hard, close-grained quartzose flagstones and shales	)	
6.	Black shales with thin earthy limestone		C

Bed A? was questionably equated with the Yoredale Grit, the uncertainty being due to faulting and drift.

In a later publication, Hull and Green (1866 p. 17) refer to the Shale Grit of Farey as a "thick bed of sandstone for the most part not very coarse, but here and there coarse and massive". This description restricts the term to a single grit bed and hence the term Shale Grit, as used to describe a sequence of alternating grits and shales, is no longer needed. To this extent only does the re-naming of Farey's Shale Grit as the Yoredale Grit seem justified. The problem of easy identification of the Yoredale Grit of Hull and Green still remains. These authors used the term for a grit which they recognised widely in North Staffordshire. In their former paper (1864), they doubtfully considered that the top of their Mixon sequence might be their Yoredale Grit. Later (1866 pp. 54 & 56), Hull and Green were uncertain of this correlation. On p. 54 they mention an outcrop one mile from Leek on the Leek - Buxton road; in a footnote they suggested that this outcrop "may belong to the Yoredale Sandstones which it is not unlike in looks". The same reservation was placed (ibid. p. 56) on their identification of the Yoredale Grit in the Mixon succession.

Hull and Green (1866 p. 59) also suggested that, on the strength of the succession on Sheen Hill (near Hartington in the Dove Valley), the Longnor Sandstone might be taken to be the Yoredale Grit. Farey (1811 p. 32) had already noted that the Shale and Shale Grit occurred on Edge Top, south-east of Longnor (SK 089650). It would seem that the lithology of the Yoredale Grit was at times so like the Yoredale Sandstones that the two groups were not easily distinguishable. Hull and Green had also failed to recognise the sequence of Churnet Shales which separates the Morredge Grits from the Longnor Sandstone. As noted above (p.304) the succession on Morredge is of Lower Namurian (E1-E2) age whilst the Longnor Sandstone belongs to the Kinderscout Grit Group, that is, it is of Upper Namurian (R1) age (Bisat and Hudson 1943 pp. 390-391).

Green (1887 p. 6) transferred the Yoredale Grit to the Millstone Grit to form its basal member and, at the same time, reverted to the use of the term Shale Grit. Later (ibid. p. 34), in discussing the Shale Grit, he wrote:

> "The upper boundary is uncertain and at a variable distance from the base of the Kinder (i.e. Kinderscout Grit); it claims only to part those beds where shale prevails from such as are mainly sandstone; and since the shales above the Shale Grit have sandstones interbedded with them and the Shale Grit itself contains thick masses of shale, and since in both cases the sandstones are most changeable in thickness, it is easy to see what must be the character of such a boundary".

Still later (p. 104), Green noted that beds which may be the equivalents of the Yoredale Sandstones of North Staffordshire, but which perhaps ought to be included in the Shale Grit, are found in Edale and about Bamford (SK 207835)

These observations show that whereas earlier (with Hull, 1866) he had considered the Shale Grit of

North Staffordshire to be restricted to a single band of Grit, he now considered that the term should be used in a much wider sense. He also saw that the delimitation of an upper boundary for the Shale Grit sequence was extremely difficult. This uncertainty as to the upper limit is apparent at several points in his memoir.

Hind and Howe (1901 p. 368) used a new term, Farey's Grit, to describe rocks outcropping on Gun Hill, in North Staffordshire. Hind and Gibson (1903 p. 177), in a report on a Geological Association excursion to North Staffordshire, stated that "quarries in Farey's Grit, here a Crowstone, were noted on the descent of Thorncliff Bank " (SK 020583). These authors were here referring to a series of alternating grits and shales of Eumorphoceras age (Hudson, 1945) lying near the foot of Morredge, some two miles north-east of Leek.

Later, Hind (1910 p. 580) placed Farey's Grit at the base of the Fifth Grit and stated that "Farey's Grit could be seen as a feature on the east side of the Ramshaw Rocks" (SK 018620), which lies some five miles north-east of Leek. Hind also stated that this grit thinned out rapidly, since it could not be identified further south. This sandstone, presumably the one in the vicinity of Drystones (SK 031626), lies some distance below the Roches Grit. Hester (1932 Table B) has shown that these latter grits are of Upper Reticuloceras (R2) age. Hence the Drystones sandstone referred to by Hind as the Shale Grit can at the most only be regarded as belonging to the Kinderscout Grit Group. A more exact correlation of the Drystones outcrops with other sandstones is impossible at the present time.

In stating that Farey's Grit could not be identified further south Hind had evidently altered his original ideas, for he had earlier recorded Farey's Grit at Thorncliff Bank, some three miles to the south of Ramshaw Rocks. He was clearly uncertain of the relationship of the Drystones sandstone to the Crowstones of Thorncliff Bank, and seemingly had not recognised the considerable thickness of Churnet Shales lying between them. He had, therefore introduced a term which was not precisely defined and which served no useful purpose.

Challinor (1921 p. 85; 1924 p. 424) suggested that the restricted use of the term Shale Grit (= Farey's Grit = Yoredale Grit) was unwarranted for the following reasons:

1. Farey referred to Gun Hill and Morredge as being formed of Shale Grit.

2. The restricted use of Farey's Grit was ill-defined by Hull and Green.

3. There is no field evidence of a continuous bed of grit lying in a position assigned to it by Hull and Green.

4. It is difficult to suppose that Farey should fix on such an ill-defined bed for conspicuous mention, whereas the general Pendleside Sandstones are just the beds that meet the eye.

As Challinor rightly points out, Farey specifically refers to Gun Hill and Morredge as being composed of Shale and Shale Grit. Farey, however, refers to numerous other localities, mostly in North Derbyshire. Whilst most of the North Staffordshire outcrops are now known to be of Upper Viséan (P) and Lower Namurian (E) age, others, together with those in North Derbyshire, have been regarded as occupying a position in the Lower Reticuloceras (R1) Stage (Jackson 1927 p. 16; Fearnsides et al. 1932 p. 169; Bromehead et al. 1933 p. 13). Farey had recognised beds of similar lithology as occurring widely over North Derbyshire and North Staffordshire. His error lay in the equation of these beds as a single unit.

Challinor's second point is only partly valid. The term Farey's Grit was not used by Hull and Green, who used the term Yoredale Grit as equivalent to "the Shale Grit of Farey". It is certainly true that the Yoredale Grit of Hull and Green is ill-defined and not easy to identify. The last two points raised by Challinor are also not entirely valid since he seems to be referring to North Staffordshire only, while the terms in question must be applied over a much wider area.

Hull and Green clearly regarded the Yoredale Grit as lying at the top of their Yoredale Series and just below the base of the "Millstone Grit" (i.e. the Fifth Grit), while Green (1887) decided to lower the base of the Millstone Grit to include the Yoredale Grit. Field evidence does in fact suggest that there is a bed of sandstone, which outcrops widely over North Derbyshire and northwards towards Leeds and Bradford. The development of this sandstone over North Staffordshire is uncertain but it is of interest here to note that the Longnor Sandstone, outcropping near Longnor in north-east Staffordshire, was regarded by Farey as being equivalent to the Shale Grit. Bisat and Hudson (1943 p. 391) regarded it as belonging to the Kinderscout Grit Group while Hudson (1945 p. 320) thought it might be either Farey's Grit or ?Fifth Grit.

Summarizing to this point, it is considered that the terms Shale Grit and Yoredale Grit, as used by Farey and by Hull and Green respectively, are inadequately defined and that the beds are difficult to locate precisely. The subsequent introduction of the term Farey's Grit (= Yoredale Grit = Shale Grit) by Hind served no useful purpose, since Hind himself considered two different grits as being Farey's Grit and gave no precise definition of his term. Thus, although Challinor suggested widening the use of the term Shale Grit (= Yoredale Grit = Farey's Grit), there seems little justification for retaining any of these terms in the sense that they were used by Farey, Hull and Green, and later, by Hind.

Jackson (1923 p. 337; 1926 p. 205) mentioned the Shale Grit only briefly. However, in a paper on North Derbyshire published in 1927 Jackson referred more fully to the Shale Grit (ibid. pp. 17-18) as:

> "a variable series of strata consisting of thick massive sandstones sometimes passing into coarser grits or even conglomerates. Interbedded with these are numerous and irregular shale bands, and in certain sections the Shale Grit is divided into an upper and a lower portion by a fairly thick shale band. An average section on the southern flank of Kinderscout gives about 425 feet of massive flaggy sandstones, some of them coarse, with beds of shale".

In a stratigraphic table (ibid. p. 17) the Shale Grit is assigned to a position in the Lower Reticuloceras (R1) Stage. However, in the paragraph following the description of the Shale Grit Jackson stated that:

> "in the use of the term Shale (or Farey's) Grit I have followed Hull and Green, who in 1864, regarded this grit as the topmost member of their Yoredale Rocks of North Staffordshire, Derbyshire, etc., though they had some doubts as to whether it ought not to be included in the Millstone Grit Series".

It has already been demonstrated that several of the North Staffordshire examples of Shale (or Yoredale) Grit are, in fact, much older than those referred to by Jackson as occurring on the southern flank of Kinderscout. It was after the appearance of Jackson's paper that the age of the beds on Morredge and Gun Hill became apparent (see Challinor 1928 p. 106; 1929 Pl. iv; Hudson 1945 pp. 320-321). The beds on the Leek-Buxton road about one mile north of Leek (see p. 306) still present problems. Specimens of Reticuloceras gracile Bisat have been collected from a series of loose bullions in Thorncliff Brook just upstream from Solomon's Hollow (SK 001582) (Morris 1966). Mudstones in this vicinity are therefore of Upper Reticuloceras (R2) age, but the relationship with the sandstones outcropping a short distance south-west of Solomon's Hollow is by no means clear. The sandstones here may be down-faulted in which case they would represent an horizon rather higher in the Upper Reticuloceras (R2) Stage.

Later authors have followed Jackson's succession, with the restricted use of the term Shale Grit. However, Hudson (1934 p. 121) would appear to have accepted Challinor's suggested widening of the use of the term Shale Grit. In this paper he refers to a series of sandstones lying immediately below the Harrogate Tunnel Series as being the Shale Grit. In the succession given, the top of the Shale Grit appears to lie at the top of the Eumorphoceras (E2 or Arnsbergian) Stage. In a later paper, however, Hudson

(1938 p. 316) refers to this same series as Shales and Grits. It would seem likely that his original use of the term Shale Grit was accidental.

As far as more recent usage is concerned Mr. I.P. Stevenson of the Geological Survey has stated (verbal communication) that the term Shale Grit has been retained during the present re-mapping of North Derbyshire and has suggested that the term is too well entrenched in geological literature to be easily abandoned.

If the correlation by Jackson of the Yoredale Grit with the Shale Grit is ignored, then the Shale Grit of Jackson is fairly clearly defined and is easily identifiable. However, the term itself remains unsatisfactory. The term implies a sequence of interbedded shales and grits occurring as a lithological unit. As shown above, such a lithology occurs on at least two different horizons in the Namurian of the south and central Pennines. Thus "Shale Grit", as a name, is imprecise since it can be applied to more than one horizon. For this reason I believe that the term Shale Grit should be abandoned. To replace this term I propose the name Grindsbrook Grit which defined below.

Grindsbrook Grit

The grit is exposed at intervals in Grindsbrook Clough (SK 118870), Edale, above the junction with Golden Clough. Exposures are irregular and confined mainly to the stream-bed with occasional outcrops of more massive bands on the hill-slopes south of the clough.

These beds are probably better exposed in Blackden Brook (SK 125887), about three miles north of Edale, in North Derbyshire. However, the "Shale Grit" of Jackson was used to describe rocks in the vicinity of Edale and it is considered better to use a name derived from the immediate area of Edale.

Beds of Lower Reticuloceras (R1) age may be divided on the basis of marine bands containing species of Reticuloceras, as follows

Zone		Sub-zone
R1c.	Reticuloceras reticulatum	(Reticuloceras co-reticulatum (R. reticulatum s.s.
R1b.	R. eoreticulatum	(R. nodosum (R. dubium
R1a.	R. inconstans	(R. todmordenense (R. inconstans

Hudson and Cotton (1945 p. 5) refer to a faunal band with Reticuloceras reticulatum s.s. a few feet below the base of the Mam Tor Sandstones. Bisat and Hudson (1943 p. 389) record that goniatites collected from the Grindslow Shales of Bleakley Dyke about 150 feet below the Kinderscout Grit belong to the R. co-reticulatum group.

Thus the Shale Grit lies within the Lower Reticuloceras (R1c) Zone between the marine bands containing R. reticulatum s.s. and R. co-reticulatum. The term Grindsbrook Grit therefore replaces the term "Shale Grit" given in the succession for North Derbyshire in Table 1.

In the Hope and Edale Valleys in North Derbyshire the Grit is from 400' - 500' thick. Southwards towards Eyam (SK 220765) it is thinning and at Eyam it is only 200' thick. The Grit is rather

TABLE 1

Correlation of parts of the Lower Carboniferous (Upper Viséan) and Upper Carboniferous (Namurian, E1 - R2 only) beds in North Derbyshire and North Staffordshire

STAGE	ZONE	NORTH DERBYSHIRE	NORTH STAFFORDSHIRE (Morredge to The Roches)
NAMURIAN	R2	Rivelin or Chatsworth Grit	Roches Grit
		Shales	
	R1	Kinderscout Grit	Churnet Shales
		Grindslow Shales	
		Shale Grit **	
		Mam Tor Sandstones	
	H	Edale Shales	
	E2		Thorncliffe Sandstones
	E1		Crowstones **
VISEAN	P2	Alport Shales	Onecote Sandstones **

** Indicates beds which have been referred to as Shale Grit by various authors

limited in its distribution, according to Bisat and Hudson (1943 p. 386). However, northwards from Edale the Grit is still recognisable in the Saddleworth valley, near Oldham. The northerly and north-westerly extensions of the Grit are represented by the Todmorden Grit of the Rossendale area, the Parsonage Grit of the Clitheroe area, the Caley Crags and Lower Plumpton Grits of the Bradford-Leeds area and the Lower Brimham Grit of Colsterdale (Ramsbottom 1966 Pl. 4).

Conclusions

It is considered that the original description of the Shale Grit by Farey refers to a lithological rather than a stratigraphic unit and that if the term is used in a stratigraphic sense then the "Shale Grit of Farey" cannot be identified with any certainty.

It is considered that the term Yoredale Grit (= Shale Grit) of Hull and Green has little value since it was inadequately defined and is not easily identifiable.

The subsequent use of the term Farey's Grit (= Shale Grit) by Hind is similarly thought to have little merit.

It is considered impracticable to widen the use of the term Shale Grit (= Yoredale Grit = Farey's Grit) since beds of different ages are involved.

Although Jackson's definition of the Shale Grit is precise and an easily identifiable series in Edale is referred to, he made the mistake of correlating the Shale Grit in Edale with the Yoredale Grit in North Staffordshire. It has been shown that the Staffordshire rocks are generally of greater age than those in North Derbyshire.

The use of the term as a stratigraphic unit is considered inadvisable since confusion with similar lithologies at other horizons could occur.

Although the term is deeply entrenched in geological literature, it is considered that the use of the term Shale Grit (of Jackson) should be abandoned. The name Grindsbrook Grit is proposed to replace the Shale Grit of Jackson.

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p. 310. Morris, Table 1. The base of the Roches Grit should approximately correlate with the base of the Chatsworth Grit not with the top of the Kinderscout Grit as shown.