

## Field excursion to the New Red Sandstone of the eastern Crediton Trough, 3rd January 1990

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The excursion area is included within the Exeter district (1:50 000 Sheet 325), the primary 1:10 000-scale survey of which was begun in 1982 by the British Geological Survey with funding by the Department of the Environment. It has continued as a multidisciplinary science budget project, part of the Lyme Bay to Bristol Channel Project, which has as its main aim the completion of a block of six 1:50 000 sheets between the south and north coasts of the peninsula.

The field excursion was intended to introduce the stratigraphy and structure of the eastern end of the Crediton Trough, an elongate east-west trending basin filled with New Red Sandstone rocks, that extends between Hatherleigh in central Devon to Silverton, north of Exeter. The basin measures 38km from west to east and a maximum of 6km from north to south. In the area covered by the excursion (Fig. 1), the Crediton Trough is fault-bounded along its southern margin; to the north, the basal New Red Sandstone breccias rest unconformably on folded strata of Late Carboniferous age (Culm Measures). Most of the New Red Sandstone strata dip gently to the south, with the exception of the southern part of the area, where a syncline is truncated against the boundary fault.

The sequence of New Red Sandstone formations present in the excursion area is shown on Fig. 1. The breccia formations are characterised by an upward increase in the variety of the contained clast types, with the Newton St Cyres Breccia and succeeding formations being characterised by granitic debris indicating the unroofing of the Dartmoor Granite. Most of the formations were probably deposited on alluvial fans.

The localities visited during the day are described in order below; the locality numbers correspond to the numbers on the map in Fig. 1. About 40 people took part in the excursion.

### 1. Coombe Barton [SS 8750 0251]: Cadbury Breccia

The party ascended the hill north of the farm, and assembled at a view-point [SS 8747 0270] near the hill-top, sited on the Cadbury Breccia outcrop. From there, looking southwards, a series of features are visible, corresponding to the scarps of the southward-dipping breccia formations which successively overlie the Cadbury Breccia. The party proceeded to nearby exposures [SS 8730 0268] of the Cadbury Breccia, visible in cuttings for a forestry track. These are exposures of typical Cadbury Breccia: up to 1.4m of a brown to reddish brown unbedded to very poorly bedded deposit consisting predominantly of angular to subrounded pebbles of sandstone in an 'earthy' matrix of very poorly sorted gritty clayey sandy silt. The sandstone clasts are mostly locally-derived Culm types. Also present are rare clasts of angular cherty shale or chert, possibly derived from the Pilton Beds of North Devon.

### 2. Raddon Quarry [SS 9090 0202 to 9102 0201]: lava in Thorverton Sandstone

The party approached Raddon Quarry along an unsurfaced track which extends westwards from a point [SS 9116 0194] about 150m north of Ratcliffe Farm, Raddon. The quarry is excavated in olivinedolerite lava which is intercalated within the Thorverton Sandstone. The lava is about 20m thick, and dips southwards at about 6°. Members of the party examined the base of a 12-15m face [SS 9079 02061] in greyish red-purple dolerite with a few amygdaloids. The quarry is presently disused, but has a long history of working, possibly from the late 12th century to well into the 19th century; the last date of full-scale operation is uncertain.

The party moved on to examine a small exposure [SS 9078 0200] in

the south-west of the quarry which shows the contact of the lava with the overlying Thorverton Sandstone. The top of the lava is very amygdaloidal greyish red basalt with amygdaloids containing white montmorillonoid minerals. The lava is overlain by an 0.3m-thick bed of hard reddish brown silty fine-grained sandstone containing eroded pieces of lava. This in turn is succeeded by 1.6m of reddish brown silty fine-grained sandstone.

### 3. Shute [SS 8910 00351]: Yendacott Breccia

The cars were parked near Shute Cross, and the party walked to small exposures [SS 8910 0035] of Yendacott Breccia beside the lane. The breccia is distinguished from the Cadbury Breccia in being finer grained, better bedded, and having a more, varied clast content, notably a variety of igneous rock types including quartz-feldspar porphyries. At this locality, the breccia contains a few beds of clayey sand. In the excursion area, the Yendacott Breccia overlies the Cadbury Breccia or the Bow Breccia, but the lower part passes eastwards into the Thorverton Sandstone (Fig. 1).

Better exposures of the Yendacott Breccia in a stream section [SS 8873 0189] were not examined owing to the size of the party and the difficulty of access.

### 4. Shute [SX 8930 9998]: Shute Sandstone

This locality shows Shute Sandstone, and a breccia which is either the underlying Newton St Cyres Breccia or a breccia lens within the Shute Sandstone. The Shute Sandstone, 2.1m of which are visible in the southern part of the exposure, consists of silty very fine-grained sandstone and silt, locally with breccia lenses. The northern part of the exposure is predominantly breccia, which contains, in addition to Culm and igneous rock types, fragments of sanidine feldspar ('murchisonite'). The murchisonite probably originated from volcanic rocks erupted in the Dartmoor area. The presence of murchisonite distinguishes the Newton St Cyres Breccia from all other breccias in the Crediton Trough, and enables a correlation with the Heavitree Breccia of the Exeter area, which similarly contains murchisonite.

Lunch was taken at the 'Beer Engine' public house at Sweetham, near Newton St. Cyres.

### 5. Newton St Cyres [SX 8795 9804]: Newton St Cyres Breccia

Good exposures of Newton St Cyres Breccia were examined at the type locality in the village of Newton St Cyres. The exposures occur alongside the A377 road, and in the lane from Sweetham just before the junction with the A377. Care should be taken to watch for traffic at the latter place. The Newton St Cyres Breccia is distinguished from the underlying Crediton Breccia (a correlative of the Yendacott Breccia) by its more sandy matrix, its greater degree of cementation, and the presence of murchisonite. Other clast types include indurated Culm sandstone, shale, slate, pelitic hornfels, chert, vein quartz, quartz-porphyry, lava, microgranite, and tourmalinite.

### 6. Brampford Speke [SX 9274 9782]: Brampford Speke Sandstone

Exposures of Brampford Speke Sandstone up to 5m high are present in river cliffs about 100m along a track east of the sharp bend in the road [SX 9266 9783] south of the village. The sandstone is reddish brown, medium- to coarse-grained, moderately cemented, and locally cross-bedded. An 0.5m-thick bed of fine-grained breccia with fragments of murchisonite is present, and also a few thin (centimetre scale) mudstone beds.

**7. The 'Black Pit' [SX 9112 9782], Upton Pyne: Manganese mineralisation along the southern margin of the Crediton Trough**

The cars were parked at Upton Pyne Village Hall, and the party walked to the site of the Pound Living Mine. The water-filled workings [SX 9112 9782] are known locally as the 'Black Pit'. The main period of working was at the end of the 18th century, when the ore was mainly used to de-colourize glass. Manganese deposits were formerly worked at several localities in the Permian sedimentary rocks close to the southern boundary fault of the Crediton Trough. The ores at Upton Pyne consist of nodular masses of manganite and rhodochrosite with some alteration to earthy pyrolusite. Textures seen in hand specimens from the dumps suggest that the ores formed by replacement of the host sediments rather than as fracture fillings.

Looking northwards, much of the ground covered during the day's excursion is visible. Mainly shallow dip slopes are seen, in contrast to the scarps seen from the southward-looking viewpoint at locality 1 (Coombe Barton).

*Acknowledgements.* All the localities visited, except No. 5, are on private land, and the leaders are grateful to landowners for permission to enter on their land. The following is a list of landowners for each locality; their permission should be sought for any future visits.

- Locality 1. Mr T.E.C. Lee, Coombe Barton.
- Locality 2. Mr E.J. Davies, Raddon Court Farm.
- Localities 3. and 4. Mr A.H. Ayre, Shute Farm.
- Locality 6. South West Water, Exeter.
- Locality 7. Mr A. Taverner, Pierces Farm.

This report is published with the approval of the Director, British Geological Survey (N.E.R.C.)

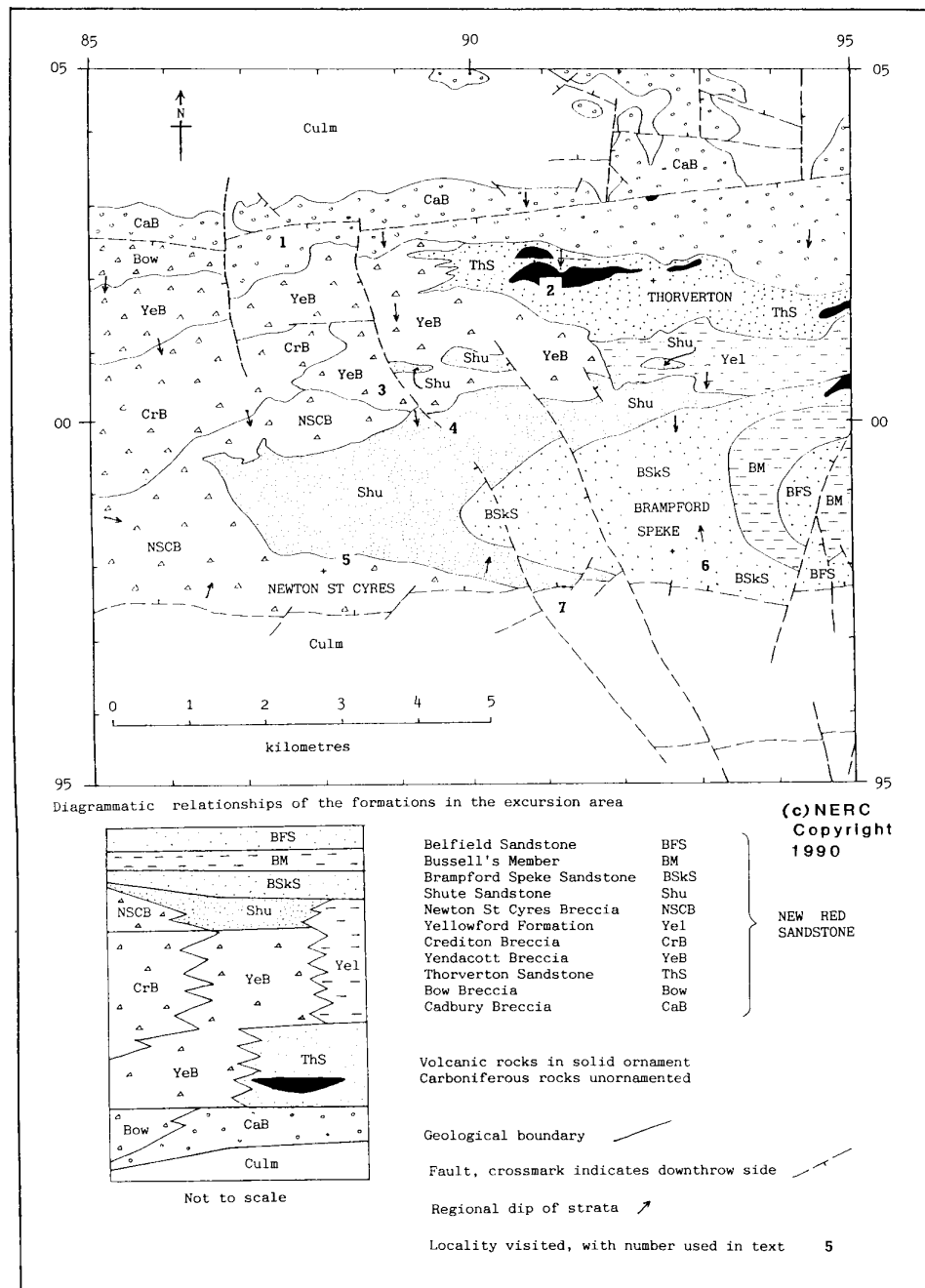


Figure 1. Geological map of the eastern end of the Crediton Trough, showing the New Red Sandstone localities visited during the excursion.