

## Information Sheet 1D: Blackdown Nappe: Late Lower to Upper Carboniferous, Bealsmill Formation ('allochthon')

### General description

The Bealsmill Formation is dominated by thickly bedded turbiditic sandstones with only minor amounts of shale, unlike the Crackington Formation, whose lower part is broadly similar in age but in which shales tend to dominate. The unit was first recognised between Dartmoor and Bodmin during geological mapping in the late 1970s and early 1980s and is characteristic of the sequence of the Blackdown Nappe (BGS 1994, 1995, etc) – named after Blackdown north of Mary Tavy and not Blackdown south of Okehampton Camp. The higher proportion of sandstone indicates a more proximal source for the Formation than the more distal Crackington Formation, as a consequence of transport from an area closer to the rising Variscan mountains to the south.

The Formation – and hence the Blackdown Nappe - outcrops as an undulating platform between the Greystone Nappe platform to the north and the steep slopes of the granite massif to the south. As with the latter, the outcrop lies entirely within the metamorphic aureole of the Dartmoor granite, although the former's relatively simple composition means that the sandstones are now all metamorphosed to quartzites as in the Vellake Brook area (Localities BF1 and BF2) and occasional shale units are now hornfels. Adjacent to the granite contact, however, abundant biotite is commonly present and locally also tourmalinisation, in part due to reaction with fluids seeping from the latter during metamorphism (Edmonds *et al.* 1968).

Folding has been described in the Formation and appears to be related to the folding of both the Blackdown and Greystone Nappes once they had arrived in the area (see Sheet 1G).

### Representative exposures in the Meldon area

LOCALITY	NGR	DESCRIPTION	REFERENCES
BF1: Quarry beside Vellake Brook	55108999	Thickly-bedded quartzite dipping 65o NW with some granite veining (Bealsmill Formation, late Lower to Upper Carboniferous; Blackdown Nappe).	Edmonds <i>et al.</i> (1968, pp.57, 168).
BF2: Vellake Brook and West Okement River	55359011-55579034 (CF2a); 55549044-55529057 (CF2b).	Quartzite exposed in stream valley (CF2a) and in West Okement River (CF2b); dips typically 40o NW-NNW. North of Vellake Corner, granite veins exposed in river intruding Bealsmill Formation (quartzite with some shaly hornfels) (Bealsmill Formation, late Lower to Upper Carboniferous; Blackdown Nappe).	Edmonds <i>et al.</i> (1968, pp.57, 178).
BF3: Tributary stream south of Meldon Reservoir	56429070-56139114	Fine-grained quartzite and grey shaly hornfels with some pyrite and 25o –60o NNW dip (Bealsmill Formation, late Lower to Upper Carboniferous; Blackdown Nappe).	Edmonds <i>et al.</i> (1968, pp.57).
BF4: Red-a-ven Brook	57879128-56999170	Recrystallised quartzite with biotite flakes adjacent to granite at 57879128. Downstream dips in quartzite around 30o NW-NNW with veins of tourmaline-rich granite at 57419125 and dykes of biotite granite downstream to 57189129. Quartzite and hornfels in tributary stream at 57069143 contain spots of pyrite and arsenopyrite (Bealsmill Formation, late Lower to Upper Carboniferous Blackdown Nappe).	Dearman (1959), Edmonds <i>et al.</i> (1968, pp.57, 168).
BF5: Black Down	587923 area	Sporadic outcrops of fine-grained quartzite in valley (Bealsmill Formation, late Lower to Upper Carboniferous; Blackdown Nappe).	Edmonds <i>et al.</i> (1968, pp.57).

## Key references

- BRITISH GEOLOGICAL SURVEY 1994. Tavistock, Sheet 337 (Solid and Drift Edition). *England and Wales, 1:50,000 Provisional Series*, NERC.
- BRITISH GEOLOGICAL SURVEY 1995. Dartmoor Forest, Sheet 338 (Solid and Drift Edition). *England and Wales, 1:50,000 Provisional Series*, NERC.
- CLEAL, C.J. and THOMAS, B.A. 1996. Culm Trough, In: CLEAL, C.J. and THOMAS, B.A., British Upper Carboniferous stratigraphy. *Geological Conservation Review Series 11*, Chapman and Hall, London, pp.37-55.
- DEARMAN, W.R. 1959. The structure of the Culm Measures at Meldon, near Okehampton, North Devon. *Quarterly Journal of the Geological Society, London 115*: 65-106.
- DEARMAN, W.R. 1962. Dartmoor, the North-west margin and other selected areas. *Geologist's Association Guides No.33*. Benham and Company, Colchester, 29pp.
- DEARMAN, W.R. 1964. The tectonics of the Upper Culm Measures around Okehampton. *Transactions of the Devonshire Association 96*: 208-227.
- DEARMAN, W.R. and BUTCHER, N.E. 1959. The geology of the Devonian and Carboniferous rocks of the North-west border of the Dartmoor granite, Devonshire. *Proceedings of the Geologist's Association 10*: 51-92.
- DURRANCE, E.M. and LAMING, D.J.C. 1982. *The Geology of Devon*, University of Exeter, 346pp.
- EDMONDS, E.A. 1974. Classification of the Carboniferous rocks of south-west England. *Report of the Institute of Geological Sciences No. 74/13*, 7pp.
- EDMONDS, E.A., WRIGHT, J.E., BEER, K.E., HAWKES, J.R., WILLIAMS, M., FRESHNEY, E.C. and FENNING, P.J. 1968. Geology of the Country around Okehampton. *Memoir of the Geological Survey of Great Britain (England and Wales)*, HMSO, 256pp.
- INSTITUTE OF GEOLOGICAL SCIENCES 1969. Okehampton: Sheet 324 (Solid and Drift Edition), One-Inch Series, Institute of Geological Sciences.
- ISSAC, K.P. 1985. Thrust and nappe tectonics of west Devon. *Proceedings of the Geologist's Association 96*: 109-127.
- ISSAC, K.P., TURNER, P.J. and STEWART, I.J. 1982. The evolution of the Hercynides in central S.W. England. *Journal of the Geological Society of London 139*: 521-531.
- SELWOOD, E.B. and THOMAS, J.M. 1884. A reinterpretation of the Meldon Anticline in the Belstone area. *Proceedings of the Ussher Society 6*: 75-81.
- THOMAS, J.M. 1982. The Carboniferous Rocks. In: DURRANCE, E.M. and LAMING, D.J.C. 1982. *The Geology of Devon*, University of Exeter, pp.42-65.
- THOMAS, J.M. 1988. Basin history of the Culm Trough in southwest England. In: BESLY, B.M. and KELLING, G. (eds), *Sedimentation in a synorogenic basin complex: the Upper Carboniferous of Northwest Europe*, Blackie, London
- WHITELEY, M.J. 2004. Culm Trough, In: COSSEY, P.J., ADAMS, A.E., PURNELL, M.A., WHITELEY, M.J., WHYTE, M.A. and WRIGHT, V.P., British Lower Carboniferous stratigraphy. *Geological Conservation Review Series 29*, Joint Nature Conservation Committee, Peterborough, pp.477-503.

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