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Classic landforms of the North Devon coast

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To any geologist interested in 'landscapes', North Devon offers a spectacular array of coastal features, the illustration of which would grace the pages of any geomorphology textbook. Yet few of these features have been 'researched' in depth and in many cases interpretation of their mode of formation, age and evolution remain equivocal. To some this inconclusiveness may be frustrating. To others it is a fertile playground for the imagination. As the memoir accompanying the recently published geology map of the district put it when discussing the Croyde district, "the field is wide open to speculation and theory, unencumbered by too rigid a framework of fact".

In this presentation, attention is drawn to longstanding local landform problems, some now ripe for further attention. At the same time the opportunity is taken to briefly luxuriate in the classic physical landscapes in which these problems are set. Problems with potential for research are listed below, together with a physical landscape bibliography drawing attention to literature on the subject to date.

1. The coastal plateaux, commonly listed as at 200, 130 and 85 metres. What is their mode of formation, age and evolution? Are any still considered to relate to Quaternary sea levels?
2. Solifluction (head) provides deep infills in coastal coombes such as Marsland Mouth (SS213174) and Strawberry Water (SS213181), and coastal cliff-foot spreads such as at Westward Ho! (SS423292) and Croyde (SS429398). What is their age and how many episodes do they represent? Are any of these pre-Devensian? Are any of Loch Lomond stadial age?
3. Truncated coastal valleys, such as Speke's Mouth (SS225236), Beckland (SS292267) and Buck's Mills (SS355236) imply rapid coastal recession; but at a rate unknown. Is the 'lower wave energy' coast of Clovelly and Bucks really eroding less quickly than that of Hartland Quay?
4. Some coastal valleys such as that around St Catherine's Tor (SS226242) are devoid of infill. Why?
5. The Gore at Buck's Mills (SS350240). Is it the lag deposit of an ancient rotational slip or a sediment trap in a low wave energy environment? What is the rate of supply of cliff sediments to the littoral sediment system which eventually feeds the pebble ridge at Westward Ho!
6. Shore platforms, such as those to the west of Westward Ho! are up to 300m wide suggesting sea levels periodically revisited and reworked the same shorelines, but the rate at which these were cut is unknown and the age and relationship between the suite of shore platforms has yet to be determined.
7. Raised beaches at Westward Ho!, Appledore, Saunton and Croyde. Are these products of the last interglacial or again reflections of a periodically revisited shoreline? What does the pebble bed at Westward Ho! which lies above the head yet below the blue clay (SS428293) represent?
8. Cliff evolution in relation to periglacial episodes is understood in principle, but the possible complexities introduced by a chain of periglacial episodes has yet to be unravelled.
9. Westward Ho! pebble ridge (SS445295). How recent a feature is this? Can we account for the accumulations of pebbles that must have occurred if this is an ancient feature?
10. Braunton Burrows. To what extent is this a relict feature? What is its future and how might this influence dune 'management'?
11. Croyde erratics. Age, provenance, mode of transport and relation to Fremington Till still undecided.
12. Morte Bay. Anomalous situation of the 'bay' being backed by the upstanding resistant Pickwell Down sandstone. Is this a fault-guided coast?
13. Exmoor cliffs. The interrelationship between structure, palaeoclimatic relicts and lithology remains a fascination along this coast. What is the morphological relationship of these cliffs to probable fault control?

Most of these questions have been around for as long as I have been a geographer! Without the prospect of rapid resolution, geomorphology some time ago quite rightly put them onto 'slow burn'. However, one cannot work in this landscape for long without them periodically tugging again at one's imagination.

Anderson, M.G. and Calver, A. 1982. Exmoor channel patterns in relation to the flood of 1952. *Proceedings of the Ussher Society*, 5, 362-367.

Andrews, J.T., Bowen, D.Q. and Kidson, C. 1979. Amino acid ratios and the correlation of raised beach deposits in South West England and Wales. *Nature*, 281, 556-558.

Appleton, E. 1877. Encroachment of the sea at Westward Ho! *Transactions of the Devonshire Association*, 9, 227-233.

Arber, E.A.N. 1911. *The coast scenery of North Devon*. Dent, London (Facsimile Edition 1969, Kingsmead Reprints, Bath).

Arber, M.A. 1949. Cliff profiles of Devon and Cornwall. *Geographical Journal*, 114, 191-197.

Arber, M.A. 1964. Erratic boulders within the Fremington Clay of North Devon. *Geological Magazine*, 101, 282-283.

Arber, M.A. 1974. The cliffs of North Devon. *Proceedings of the Geologists' Association*, 85, 147-157.

Balaam, N.D. et al. 1987. Prehistoric and Romano-British sites at Westward Ho! Devon: archaeological and palaeo-environmental survey 1983-4. In: Balaam, N.D., Levitan, B. and Straker, V. (eds) *Studies in Palaeoeconomy and Environment in South West England, British Archaeological Reports Series 181*, 163-264.

Balchin W.G.V. 1952. The erosion surfaces of Exmoor and adjacent areas. *Geographical Journal*, 118, 453-376.

Bleasdale, A. and Douglas C.K.M. 1952. Storm over Exmoor on August 15, 1952. *Meteorological Magazine, London*, 81, 353-367.

Bowen, D.Q. et al. 1985. Amino acid geochronology of raised beaches in South West Britain. *Quaternary Science Reviews*, 4, 279-318.

Boyle V.C. 1949. Report on coastal erosion at Westward Ho! *Transactions of the Devonshire Association*, 81.

Bradbeer, J. 1987. *North Devon: a sense of place in the writings of Henry Williamson*. Department of Geography, Portsmouth Polytechnic.

Bradbeer, J. 1987. *A review of progress and problems with particular reference to the Hartland Heritage Coast of Devon*. Department of Geography, Portsmouth Polytechnic.

Churchill, D.M. 1965. The kitchen midden at Westward Ho! N. Devon, England: ecology, age and relation to changes in land and sea level. *Proceedings of the Prehistoric Society*, 31, 74-84.

Cornford, C. and Childs, A. 1989. *Geology at Hartland Quay*. Thematic Trails, Oxford Polytechnic.

Countryside Commission 1970. *Northam Burrows; a study in conservation and management*. Countryside Commission, London.

Dalzell, D. and Durrance, E.M. 1980. The evolution of the Valley of Rocks. *Transactions of the Institute of British Geographers NS 5 (1)*, 66-79.

- Dartington Amenity Research Group 1980. *North Devon, a brief appraisal of problems and opportunities*. Dartington Hall, South Devon.
- De Freitas, M.H. 1972. Some examples of cliff failure in S.W. England. *Proceedings of the Ussher Society*, 2, 338-397.
- Dewey, H. 1910. Notes on some igneous rocks of North Devon. *Proceedings of the Geologists' Association*, 21, 429-434.
- Dewey, H. 1913. The raised beach of North Devon: its relation to others and to palaeolithic man. *Geological Magazine*, 10 (5) 429-434. Dobbie, C.H. and Wolf, P.O. 1953. The Lynmouth flood of August 1952. *Proceedings of the Institution of Civil Engineers*, 2, 522-588.
- Durrance, E.M. and Laming, D.J.C. (eds) 1982. *The geology of Devon*. University of Exeter.
- Edmunds, E.A. 1972. The Pleistocene history of the Barnstaple area. *Institute of Geological Sciences Report No 72/2, London*.
- Edmunds, E.A., Williams, B.J. and Taylor, R.T. 1979. Geology of the country around Bude and Bradworthy. *Memoirs of the Geological Survey of Great Britain, London*.
- Edmunds, E.A., Williams, B.J. and Taylor, R.T. 1979. Geology of Bideford and Lundy Island. *Memoirs of the Geological Survey of Great Britain, London*.
- Edmunds, E.A., Whittaker, A. and Williams, B.J. 1985. Geology of the country around Ilfracombe and Barnstaple. *Memoirs of the British Geological Survey, London*.
- Evans, H.M. 1912. Sand formation against the Saunton Downs cliffs. *Transactions of the Devonshire Association*, 692.
- Gerrard, A.J. and Dawson, M. 1981. Spatial variation in beach sediments at Morte Bay, North Devon. *Proceedings of the Ussher Society*, 5, 206-216.
- George, K.J. and Bates, D.J. 1980. The 60 year sea level at Barnstaple as estimated using the convolution method. *Proceedings of the Institution of Civil Engineers*, 69 (2), 827-834.
- Gifford, J. 1953. Landslides on Exmoor caused by the storm of 15th August 1952. *Geography*, 38, 9-17.
- Green, G. W. 1955. North Exmoor floods, August 1952. *Bulletin of the Geological Survey of Great Britain*, 7, 68-84.
- Greenwood, B. 1972. Modern analogues and the evaluation of a Pleistocene sedimentary sequence. *Transactions of Institute of British Geographers*, 56, 145-169.
- Greenwood, B. 1978. Spatial variability of texture over a beach-dune complex, North Devon, England. *Sedimentary Geology*, 21, 27-44.
- Halcrow, Sir W. 1980. *Pebbleridge, Westward Ho! a report*. Sir William Halcrow and Partners, Swindon.
- Hall Townsend, M., 1866. The geology of North Devon. *Exeter Naturalist's Club, 23rd Sept 1865, London*.
- Hall Townsend, M. 1879. Note on the occurrence of granite boulders near Barnstaple, and of a vein of granitoid rock at Portledge. *Transactions of the Devonshire Association*, 11, 429-432.
- Hall Townsend, M. 1889. The submerged forest of Barnstaple Bay. *Quarterly Journal of the Geological Society of London*, 35, 106.
- Hamling, J.G. and Rogers, I. 1910. Excursions to North Devon, Easter 1910. *Proceedings of the Geologists' Association*, 21, 457-472.
- Hawkins, A.B. 1973. Sea level changes around South West England. In: Blackman, D.J. (ed) *Marine Archaeology*. London, Butterworth.
- Heyworth, A. and Kidson, C. 1982. Sea level changes in South West England and Wales. *Proceedings of the Geologists' Association*, 93 (1), 91-111.
- Keene, J. 1985. *Westward Ho! Ecology Trail: beach, sand-dune and salt-marsh*. Thematic Trails, Oxford Polytechnic.
- Keene, J. 1987. *Braunton Burrows Ecology Trail*. Thematic Trails, Oxford Polytechnic.
- Keene, P. 1986. *Classic Landforms of the North Devon Coast*. Geographical Association, Sheffield.
- Keene, P. 1986. *Westward Ho! Coastal Landscape Trail*. Thematic Trails, Oxford Polytechnic.
- Keene, P. 1986. *Westward Ho! man against the sea*. Thematic Trails, Oxford Polytechnic.
- Keene, P. 1986. *History of coastal erosion at Westward Ho! a chronological index to sources with notes*. Thematic Trails, Oxford Polytechnic.
- Keene, P. 1989. *The Cliffs of Hartland Quay*. Thematic Trails, Oxford Polytechnic.
- Keene, P. 1989. *Strawberry Water to Marsland Mouth*. Thematic Trails, Oxford Polytechnic.
- Kidson, C. 1953. The Exmoor storm and the Lynmouth floods. *Geography*, 38, 1-9.
- Kidson, C. 1963. The growth of sand and shingle spits across estuaries. *Zeitschrift für Geomorphologie*, 7, 1-22.
- Kidson, C. 1971. The Quaternary history of the coasts of South West England, with special reference to the Bristol Channel coast. In: Gregory, K.J. and Ravenhill, W. (eds) *Exeter Essays in Geography*, University of Exeter, 1-22.
- Kidson, C. 1977. The coast of South West England. In: Kidson, C. and Tooley, M.J. (eds) *The Quaternary History of the Irish sea*. Seel House Press, Liverpool.
- Kidson, C. and Wood, R. 1974. The Pleistocene stratigraphy of Barnstaple Bay. *Proceedings of the Geologists' Association*, 85, 223-237.
- McClellan, W.N. 1953. The Lynmouth flood of 15 August 1952. *Journal of the Institute of Water Engineers*, 7, 157-159.
- McFarlane, P.B. 1955. Survey of two drowned river valleys in Devon. *Geological Magazine*, 92, 419-429.
- Madgett, P.A. and Inglis, A.E. 1987. A re-appraisal of the erratic suite of the Saunton and Croyde Areas, North Devon. *Transactions of the Devonshire Association*, 119, 135-144.
- Madgett, P.A. and Madgett, R.A. 1974. A giant erratic on Baggy Point, North Devon. *Quaternary Newsletter*, 14, 1-2.
- Marshall, W.A.L. 1952. The Lynmouth floods. *Weather*, 7, 338-342.
- Maws, G. 1864. On a supposed deposit of boulder clay in North Devon. *Quarterly Journal of the Geological Society, London*, 20, 445-451.
- Mottershead, D.N. 1977. Devon Valley of Rugged Rocks. *Geographical Magazine, London*, 49, 711-714.
- Mottershead, D.N. (ed) 1977. *Guidebook; INQUA Excursions A' and C', South West England*.
- Northam Burrows Urban District Council 1967. *Sea defences at Westward Ho!* (Report by 'River & Sea Gabion' Ltd of on-site inspection made with engineer and surveyor to NUDC). River & Sea Gabions (London) Ltd.
- Pengelly, W. 1867. The raised beaches in Barnstaple Bay, North Devon. *Transactions of the Devonshire Association*, 1, 43-56.
- Pengelly, J. 1892. The granite boulder on the shore of Barnstaple Bay, North Devon. *Transactions of the Devonshire Association*, 6, 211-222.
- Rogers, E.H. 1946. The raised beach, submerged forest and kitchen midden at Westward Ho! and the submerged stone row at Yelland. *Proceedings of the Devonshire Archaeological Exploration Society*, 3, 109-135.
- Rogers, I. 1908. On the submerged forest at Westward Ho! Bideford Bay. *Transactions of the Devonshire Association*, 40, 249-259.
- Savidge, R.A.G. 1962. Some observations on slope development in North Devon and North Cornwall. *Transactions of the Institute of British Geographers*, 31, 23-42.
- Sedgwick, A. and Murchison, R. 1836. Description of a raised beach in Barnstaple Bay, on the North West Coast of Devonshire. *Transactions of the Geological Society*, 5, (2nd series), 279-286.
- Simpson, S. 1953. The development of the Lyn drainage system and its relation to the origin of the coast between Combe Martin and Porlock. *Proceedings of the Geologists' Association*, 64, 14-23.
- Slade, G.O. 1962. Westward Ho! Pebleridge breached from the rear. *The Surveyor, January 1962*.
- Slade, G.O. 1962. Westward Ho! Pebleridge. *The Surveyor, June 1962*, 812-814.
- Spearing, H.G. 1884. On the recent encroachment of the sea at Westward Ho! North Devon. *Quarterly Journal of the Geological Society*, 159, 474-478.
- Stephens, N. 1966. Some Pleistocene deposits in North Devon. *Biuletyn Peryglacjalny*, 15, 103-114.
- Stephens, N. 1970. The West Country. In: Lewis, C.A. (ed) *The glaciation of Wales and adjoining regions*. Longmans, London, 267-314.
- Stephens, N. 1974. North Devon. In: Straw, A. (ed) *QRA Easter Meeting Field Handbook, Exeter*.
- Straw, A. 1985. Observations on certain large scale geomorphological features in south-west England. *Proceedings of the Ussher Society*, 6, 265-267.
- Sutcliffe, A.J. 1975. A probable interglacial site near Barnstaple. *Quaternary Newsletter*, 16.
- Taylor, C.W. 1956. Erratics of the Saunton and Fremington area. *Transactions of the Devonshire Association*, 88, 52-64.
- Taylor, C.W. 1958. Some supplementary notes on Saunton erratics. *Transactions of the Devonshire Association*, 90, 187-191.
- Williams, D. 1837. On the raised beaches of Saunton Downend and Baggy Point. *Proceedings of the Geological Society of London*, 2, 535.
- Willis, A.J., Folkes, B.F., Hope-Simpson, J.P. and Yemm, E.W. 1959. Braunton Burrows: The Dune System and its Vegetation. *I. Journal of Ecology*, 47, 1-24.