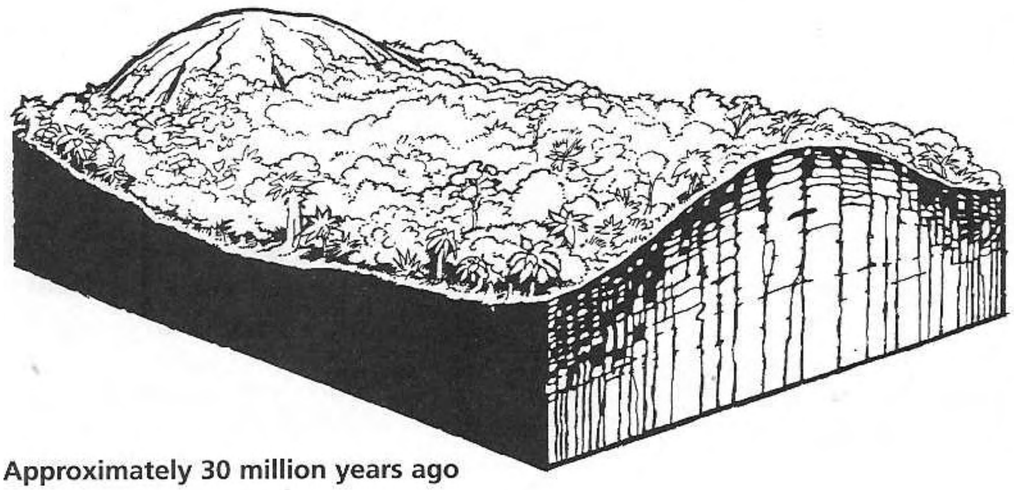
Information Sheet 1H: Quaternary

General description

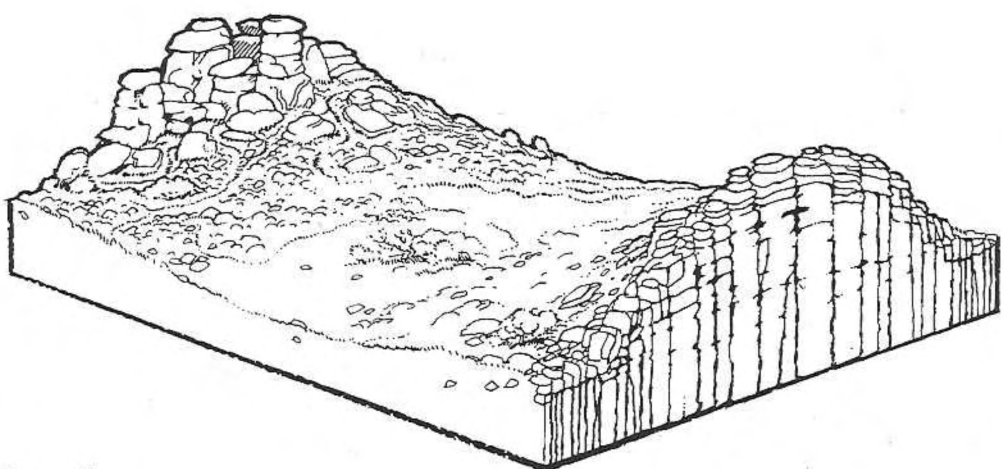
During the Palaeogene and Neogene the granite was certainly exposed at the surface and would have been subjected to intense tropical weathering during which kaolinisation of feldspar crystals to form china clay would have caused some parts of the outcrop to disintegrate into clayey sand, or 'growan' (to use the Cornish term). Such processes would have continued into the Quaternary, but it is clear that the granite was not affected uniformly by such alteration as parts now rise as tors above areas where growan is extensively developed. It is possible that in part, at least, this is a consequence of slight variations in composition of different granite sheets within the intrusion (see Sheet 1D).

View of Yes Tor from the north-east showing terraces of presumed periglacial origin (Photo: Kevin Page 2005)

With the collapse of global temperatures and the onset of periodically ice age conditions during the Pleistocene, permafrost conditions took hold across the region, and would have been particularly intense on the high ground of Dartmoor. Seasonal melting of the top metre or so of the permafrost during the slightly warmer summers caused solifluction to develop as loose soil and rock to begin to creep downhill as a stony sludge. Such processes would eventually expose unweathered granite cores on the crest of hills, thereby creating the tors. As movement continued, large boulders and fine grained materials became separated, the latter often form distinctive 'garlands' and 'boulder trains' downslope. Collectively, these boulder scatters on the flanks of tors are known as clitter. In places, for instance below Yes Tor, a series of sloping terraces appears to be another consequence of periglacial flow.



Approximately 30 million years ago



Present

The formation of Dartmoor tors © DNPA. Upper diagram: intense chemical weathering of the granite under tropical conditions, especially along joints, leads to the alteration of feldspar crystal to china clay ('kaolinisation') causing disintergration of areas of solid rock. Lower diagram: under ice age periglacial conditions, seasonal flow of surface layers moves weathered, crumbled granite downslope and exposes solid, unweathered granite as tors, which then break-up under freeze-thaw action, forming rocky clitter. When the ice melted the landscape remained, metaphorically, 'frozen' in time with granite blocks left waiting for another ice age to begin so that they can move again…

Most of these features on Dartmoor undoubtedly formed during the last ice age, the Devensian, as earlier features are likely to have been either modified during the preceeding interglacial, the Ipswichian, or reprocessed during the Devensian. River terraces, however, may ultimately provide further glimpses of earlier phases in the evolution of the area. Such terraces are created as a river cuts down through a previous floodplain in response to some change in the river system such as sea-level change or capture by an adjacent system. The lowest, or First Terrace, is well developed in the valleys of the Okement rivers around Okehampton and in places is up to around 3 m above current river level, locally showing a basal level rich in boulders with finer grained stony and sandy material above (Edmonds *et al*. 1968; Page 2006). It is possible that this First Terrace is of Ipswichian age, although no direct proof of age is known.

There are also suggestions of higher terraces but detailed mapping would be needed to demonstrate their relationship to the First Terrace. Such terraces would be likely to be pre-Ipswichian. In the Meldon area itself, terraces are poorly developed, although narrow platforms beside the Red-a-Ven Brook and West Okement River may be remnants of such features. Modern river systems in the area, however, generally have relatively narrow floodplains, often cut through earlier terrace-like features and frequently flow directly over bedrock.

The Red-a-ven Brook (Locality Q12) is a good example of stream system which has cut through several terrace-like features as it leaves the granite massif and descends towards the West Okement valley near Meldon Viaduct. The stream initiates in blanket bog high on the granite, then passes through a steep section as it crosses the margins of High Willhays-Yes Tor massif and thence into the metamorphic aureole of Dartmoor granite where a steep sided middle portion includes a broad, level, alluvial fill. Downstream, the course steepens dramatically and associated terrace/alluvial features narrow as the Brook crosses the Lower Culm Group outcrop, often with waterfalls. The junction with the West Okement river is marked by boulder rich fan, possibly periglacially modified and certainly at a higher level than the current West Okement.

The Red-a-ven Brook valley from Meldon Viaduct, showing a steep sided section crossing the ridge of Lower Culm Group hornfels (which includes Meldon Quarry to the left) and a broad boulder-littered fan-like feature in the foreground (Photo: Kevin Page 2005)

On the highest areas of Dartmoor, waterlogged basins, possibly head filled have developed peat bogs, and blanket bog is widespread across the high moor south and east of Yes Tor. Very locally (as near Dinger Tor) these deposits have been dug, presumably as a fuel (see also Sheet 3G).

Representative Quaternary features in the Meldon area

LOCALITY	NGR	DESCRIPTION	REFERENCES
Q9: West Okement river west of Homerton Hill	559901	Valley is cut along the line of the Pewsey Fault and includes marginal terrace like features. At 559901, at the steep edge of the Moor, alluvium is full of large rounded boulders (Quaternary: Pleistocene-Recent).	Edmonds and others (1968, p.198).
Q12: Red-a-Ven Brook.	585895-565912	Stream system initiating in blanket bog on granite massif, then passing through steep margins of massif and hence into metatmorphic aureole of Dartmoor granite. Steep sided middle part includes broad, level, ?alluvial fill developed where Red-a-Ven Brook crosses the Crackington Formation outcrop. Downstream, course steepens dramatically and associated terrace/alluvial features narrows as the Brook crosses the Lower Culm Group outcrop. Bedrock well exposed in latter area, with waterfalls. Junction with West Okement river marked by boulder rich fan (Quaternary: Pleistocene-Recent).	Pers. obs. (2005)
Q13: Yes Tor-High Willhays ridge – West Mill Tor - Roughtor	58089097 - 58769097 - 59319164	Highest part of Dartmoor granite massif at up to 621m. Includes well developed tors and clitter slopes at margins of granite outcrop and series of terrace-like features below Yes Tor (?periglacially formed) (Quaternary: Pleistocene).	Pers. obs. (2005)

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