Rep. Trans. Devon. Ass. Advmt Sci., **119**, 135–144
December 1987

A Re-Appraisal of the Erratic Suite of the Saunton and Croyde Areas, North Devon

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Abstract

A recent survey of the erratic suite of the Croyde and Saunton areas shows this to be much larger in both numbers and variety than previously reported. Some of these earlier reports have been found to be misleading and occasionally in error. Certain erratics are now rejected while confusion over others is clarified. A list of the recent finds is appended, with a brief note on the novel stratigraphic context of one of these; detailed descriptions and discussions are the subject of a separate paper, in preparation.

THE discovery, in May 1981 by Mrs E. A. Inglis, of a large boulder of rhyolitic tuff in a novel stratigraphic context on Croyde beach prompted systematic searches of the foreshore and cliffs from Saunton beach to Baggy Point, in order to compile a photographic record of all known erratics. Many previously unreported large erratic boulders were discovered, whilst the existing literature on the subject was found to be in need of revision.

Historical background

The Saunton and Croyde area has been famous for its 'giant' coastal erratic boulders for 150 years, since Rev. D. Williams first drew attention to the Saunton pink granite in 1837. This huge rounded block, estimated by Hall (1879) to weigh between 10 and 12 tons, was referred to as either a 'pink' or 'red' granite by a succession of authors over the next century, including Bate (1866); Pengelly (1867, 1873); Hall (1879); Lee (1881); Hughes (1887); Prestwich (1892); Hamling and Rogers (1910); Dewey (1910, 1913) and Evans (1912).

Hall (1879) referred to other large boulders but gave no details.

Hughes (1887) was the first to give any clear decription of these—a 'grey porphyry' at Saunton and a 'gneissose granite' ¼ mile west of Middlesborough, Croyde. The latter is the so-called '50-tonner' near Freshwater Gut. Prestwich (1892) mentioned a 'red granite' on 'Baggy Point' (later considered by Taylor, 1956, to be a confusion with Saunton Cliffs) and also a 'fine-grained white granite' and a 'hornblendic granite' 'in other parts of the cliffs'; the vague descriptions do not allow these to be located more accurately. This 1892 paper includes the first reference to 'smaller erratics in the beach gravels'.

Dewey (1910) gave the first detailed petrological descriptions, of the Saunton pink granite and of a foliated granite from Saunton Down End. The description of the latter erratic matches that known locally as the 'White Rabbit', from its habit of appearing and disappearing in modern beach shingle in one of the gullies below high-tide mark.

Taylor (1956) arranged for the re-excavation of the Saunton red/pink granite after a cliff fall in 1950 had completely buried it. He explored the coast from Saunton to Baggy 'in order to ascertain which of the erratic of early geologists were still visible, and to pin-point and describe such as were found, more definitely than had been done in some cases in the past' (Taylor, 1956, p. 52). Taylor's resultant account, together with its 1958 supplement, still stands as the only really detailed modern work on the erratics of the area.

He described a total of 11 erratic boulders and stones from the Saunton and Croyde coastline, and a further 5 from the Fremington area, south of the Taw estuary. However, one of the Saunton boulders (Taylor, 1956, 5a) was described as a 'grey grit' similar to the Carboniferous sandstones of the Barnstaple Bay area; hence he did not regard this as a true erratic. Of his smaller erratics a 'rounded 12 inch slab' of dolerite at Laticosta Cove, Baggy Point, had apparently disappeared by 1958. Three other erratics found on a traverse of the foreshore of Saunton Down End were described as pebbles of schorl, white granite, and quartz porphyry, respectively 3, 9, and 3 inches across, and were mentioned only to indicate the variety of pebbles to be found at this locality. The other erratics Taylor described are considerably larger: the granulite gneiss ('50-tonner') near Freshwater Gut; a 2 foot agglomerate boulder at Laticosta Cove, not previously described; the Down End gneiss (Dewey's 'foliated granite'); the Saunton red granite; with nearby Hughes' grey porphyry now re-described first as a trachyandesite (Taylor, 1956, p. 56), then as a spilite (Taylor, 1958, p. 188), though apparently much reduced in size since 1887; and also (Taylor, 1958, p. 189) a 'new' quartz porphyry nearly 4 feet across.

Stephens (1966, 1970, 1973, 1974) mentioned several of the giant erratics and their stratigraphic contexts, and included maps (the first

published) showing their locations, along with those of other Quaternary features. The 1966 and 1970 maps show various un-named erratics; by matching their positions with those named on the 1974 map it appears that the two earlier maps show only those erratics described by Taylor (1956, 1958), though excluding the Saunton 'grey grit' (presumably because of its probably local origin) and the Laticosta Cove agglomerate. North of the Down End gneiss two granites and a quartz porphyry are shown. As no descriptions are given, these may be the three pebbles referred to by Taylor (1956)—see later discussion. The 1974 map adds an arkose and a sandstone on Baggy Point and a Carboniferous Limestone at Saunton.

In the text of these papers Stephens referred also to 'Carboniferous limestone erratics . . . recovered from the surface of the main head' (Stephens, 1966, p. 107); 'erratics and striated pebbles . . . recovered from Braunton Great Field' (Stephens, 1966, p. 110); and erratic stones including 'flint, granite' and 'chert, mica-schist, fine-grained dark igneous rock' recorded from the lower parts of sections in stony clay and pebbly deposits at the Croyde Brook and Lime Kiln sites (Stephens, 1974, p. 41). Further striated stones and a few erratics were recorded from stony clays exposed in road sections between Croyde village and Middlesborough (Stephens, 1974, p. 40). Stephens (1973, p. 43) mentioned 'many other small erratic boulders and pebbles contained in the raised beach gravels, and lying on the present beach and inter-tidal platform'. No details were given, reference being made to Taylor's 1956 paper.

Kidson (1971, 1974, 1977); Kidson and Wood (1974); Kidson and Heyworth (1977) and Edmonds (1972) referred to several of the well-known 'giant' erratics, but advocated different stratigraphic interpretations to those of Stephens.

Madgett and Madgett (1974) gave the first description of an erratic boulder away from a beach or cliff-base position on the north side of the Taw estuary. This was the discovery of a 700 kg epidiorite boulder lying in a field at about 80 m O.D. above Ramson Cliff, Baggy Point.

Edmonds *et al.* (1979) summarised the earlier finds, but omitted the Ramson Cliff epidiorite and equated Hughes' 1887 grey porphyry with Taylor's (1956) trachyandesite. They made no mention of Taylor's (1958) re-description of the latter as a spilite, nor of Taylor's (1958) finding of a grey porphyry at Saunton. Edmonds *et al.* (1979) did, however, refer to a granitic fragment at the south end of Croyde Bay; 'several small granitic fragments . . . near Down End'; and 'small fragments of granitic rocks . . . sparsely scattered on the beaches and along the estuary' (Edmonds *et al.* 1979, p. 108). No further details of these were given.

Cullingford, in Durrance and Laming (1982), reproduced Stephens' 1974 map, adding the location, though not the name, of the Ramson Cliff epidiorite. The significance of this erratic was discussed by Keene (1986), who also added a gneiss erratic in a low-tide gully, south-east of Saunton Down End, to those already on the earlier maps; no description was given.

Re-Appraisal of the existing literature

The authors have succeeded in relocating all the erratics referred to in the earlier literature, with the exception of Taylor's three 'pebbles' at Down End, Stephens 'two granites and quartz porhpyry at Down End, and Edmonds' 'granitic fragments'.

It became clear that there are many more large erratics than have been reported in the past, whilst comparison of the actual boulders with earlier descriptions pointed to certain ambiguities and discrepancies.

Searches for Stephens' granites and quartz porphyry at Down End produced large numbers of pebbles, cobbles and boulders of a variety of non-local rock-types, including granites, schorlrock, and quartz porphyry. However, none of these latter lithologies were larger than 20 cm across in the vicinity of the specimens mapped by Stephens, to the north of Shelly Cove. It was therefore concluded that the 1974 map probably referred to the earlier finds of 'pebbles' by Taylor (1956).

A few boulders, several cobbles, and numerous pebbles of granite were located between the south end of Croyde Bay and Saunton Beach; as Edmonds *et al.* (1979) gave no details of size or precise locations for their 'granitic fragments' it is impossible to say which, if any, of those located by the present survey correspond to those referred to in the Memoir.

The maps in Stephens (1974), Cullingford (1982) and Keene (1986) show an arkose and a sandstone on Baggy Point, close to the granulite gneiss. The sandstone was readily located, as Stephens (1970, opposite p. 272) included a photograph of it in front of the gneiss, the caption stating that it is 'a local rock type'. Close to this sandstone is another rounded sandstone boulder, lichen-encrusted, 90 cm across, and possibly the arkose referred to by Stephens. As there are many large rounded sandstone boulders of various types along both the Baggy and Saunton foreshores, and the local Devonian rocks include many massive sandstone layers, it seems unwise to regard any such boulder as a potential erratic until detailed petrographic and provenance determinations are undertaken.

Taylors' (1956) small dolerite slab was relocated beside his agglomerate inside the small cave known locally as 'The Ladies' Changing Room' at Laticosta Cove. Both boulders are subject to

movement in and out of this cave at extreme high tide and storm conditions, so it is not surprising that Taylor should have 'lost' the dolerite between 1956 and 1958. However, at only 29 cm across, it is only one of several such small erratic boulders of various lithologies to be found in this locality.

The Carboniferous Limestone shown by Stephens (1974) between the quartz porphyry and the red granite at Saunton proved to be a metre-long elongate boulder resting in a gully cut in the Pilton Beds. Other sizeable cobbles and boulders of this lithology occur on the Saunton foreshore and on the north side of Croyde Bay. In common with the surface finds recorded by Stephens, and confirmed by the present authors in various fields around Croyde, they may have originated from the coastal trade in limestone from South Wales, as remains of a lime-kiln still exist at Croyde Bay. However, the size and position of Stephens' limestone boulder would seem to require a ship foundering on the rocks hereabouts, unless it is a true erratic.

Comparison of the descriptions of the Saunton quartz porphyry given respectively by Hughes (1887) and Taylor (1956, 1958) have led to the conclusion that Taylor mis-identified Hughes' erratic. Taylor equated his No. 2 erratic with Hughes' grey porphyry, but re-described it as a trachyandesite (1956), then a spilite (1958). Hughes (1887) recorded his porphyry as 4 feet across, stating that it 'rises out of a little pool between the jagged ridges of the rock just in front of a small alcove or cave . . . On the south side of it a fold over of one of the harder beds has caused a stronger barrier than usual and probably determined the position in which it rested' (Hughes, 1887, pp. 664–5). He also gives a sketch of the boulder's position (Hughes, 1887, p. 665). Taylor's spilite, on the other hand, was described as only two feet in length and height, 'while a grey vein of fine-grained rock about two inches wide traverses the upper part'; he found it 'lying in one of the long pools formed through the rupture of the upturned Pilton beds by faulting obliquely to the strike' (Taylor, 1956, p. 55).

Taylor (1958, p. 189) noted as a 'new erratic' his No. 11, 'lying only 230 yds. west of the Saunton granite No. 1, being deeply set in the shingle within a large arch or recess at the foot of the cliff and further screened from view by a ridge of the Pilton beds'. He described it as 'of dark grey-green colour in fresh fracture, with porphyritic felspar, and well smoothed and domed, visible measurements being 2 ft. 6 in. high by 3 ft. 9 in.'. Taylor included a photograph of this erratic (facing p. 190), which was readily relocated by the authors, to whom it seem that Hughes' description of his 'grey porphyry' matches admirably that of Taylors' No. 11, a 'quartz-bearing porphyrite'. The locality descriptions for these can only refer to the same spot along the cliffs.

Hence it seems that Taylor's spilite (his No. 2) was the only truly 'new' boulder. This is still in the fault-guided gully and still the same size as measured in 1956. Thus, far from having 'suffered appreciable erosion' since 1887 (Taylor 1956, p. 55), Hughes' porphyry has maintained its size and position, while Taylor's spilite neither appears to have moved nor diminished in size appreciably since 1956.

A summary of the published records of erratics in the Croyde–Saunton area appears in Table I. However, the recently published maps (Stephens 1966, 1970, 1974; Cullingford 1982; Keene 1986) apparently include some sandstones of probably local provenance (Stephens, 1970), and some small erratics (Taylor, 1956, 5c), while the Laticosta Cove dolerite slab (Taylor, 1956, 5b) at 29 cm across only just qualifies as a boulder on the Wentworth Scale (256 mm), and then only if the maximum dimension is taken. The Carboniferous Limestone may be shipborne from South Wales. Therefore this table excludes all erratics less than 25 cm across and those of doubtful 'erratic' nature, while correcting earlier mis-identifications. At the same time a numbering system is adopted, in order of publication date.

Report on the new discoveries, 1981–1986

Since the 1981 discovery of a large boulder of rhyolitic tuff at Croyde a further 27 erratic boulders (long axis of 25 cm. or greater) have been

TABLE I

Erratic boulders of the Croyde and Saunton areas: Previously Published Records

Number	*Lithology*	*Size (cm)*	*Grid Ref.*	*First publication*
1	Pink/red foliated granite	240×210×100(+)	SS44013786	Williams 1837 (=Taylor 1956 No. 1)
2	Granulite gneiss ('50-tonner')	420×220×200(+)	SS42794001	Hughes 1887 (=Taylor No. 4)
3	Quartz porphyry	150×135×100(+)	SS43803793	Hughes 1887 (=Taylor No. 11)
4	Foliated granite/ gneiss ('White Rabbit')	120×75×50(+)	SS43123849	Dewey 1910 (=Taylor No. 3)
5	Grey spilite	80×80×45	SS43933787	Taylor 1956 No. 2
6	Dolerite	29×13×5	SS42724005	Taylor 1956 No. 5b
7	Agglomerate	75×60×40	SS42724005	Taylor 1956 No. 5b
8	Epidiorite	105×55×38	SS43564070 (now at: SS43564075)	Madgett and Madgett 1974
9	Contorted gneiss	100×90×90(+)	SS43343813	Keene 1986

located in the Croyde–Saunton area (see Table II). This brings the total reported (and accepted by the present authors as true erratics) to 37. Most of the erratics, of a wide range of lithologies, are of little direct stratigraphic interest, though they may have entered the area by a variety of mechanisms. Thin sections have been made from most of the larger erratics and some of the smaller ones; a paper is in preparation

TABLE II

New Records, 1981–1986

Number	*Lithology*	*Size (cm)*	*Grid Ref.*	*Discoverer/date*
10	Rhyolitic tuff	84×56×37	SS43563923	E.A.I. 5/81
11	Gneiss	135×90×52	SS43183847	B.M. 4/82
12	Polymictic conglomerate	35×25×23	SS42754003	P.M. 4/82
13	Tuff	25×20×12	SS42754003	P.M. 4/82
14	Greenstone	55×40×30(+)	SS44423779	E.A.I. 9/82
15	Granite	25×16×9	SS43113846	P.M. 4/83
16	Meta-Dolerite	30×19×12	SS43113849	P.M. 4/83
17	Foliated microgranite	27×20×14	SS43113849	P.M. 4/83
18	Feldspar porphyry	37×27×19	SS43103836	P.M. 4/83
19	Rhyolitic tuff	40×23×22	SS43103837	P.M. 4/83
20	Tuff	25×20×15	SS43093838	P.M. 4/83
21	Feldspar porphyry	29×21×14	SS43083836	P.M. 4/83
22	Porphyritic microgranite	125×95×60(+)	SS44033786	P.M. 4/83
23	Microdiorite	33×17×6	SS43543925	E.A.I. 6/83
24	Feldspar porphyry	25×19×14	SS43103850	P.M. 7/83
25	Microgranite	41×20×15	SS43093852	A.M. 7/83
26	Quartz conglomerate	27×19×11	SS43123837	P.M. 7/83
27	Crystal tuff	31×23×15	SS43473920	P.M. 7/83
28	Purple tuff	32×29×12	SS43433918	P.M. 7/83
29	Granite	76×69×45	SS43473901	E.A.I. 8/83
30	Brecciated granite	30×23×20	SS43473903	E.A.I. 8/83
31	Rhyolite	48×33×32	SS43133847	E.A.I. 5/84
32	Porphyritic rhyolite	35×28×18	SS43173822	E.A.I. 5/84
33	Tuff	40×25×25	SS43423801	A.M./B.M. 7/84
34	Amphibolite	95×60×40(+)	SS43683795	P.M. 7/85
35	Brecciated lava	65×31×25(+)	SS44323782	P.M. 8/85
36	Granite	40×28×25	SS43723794	P.M. 12/85
37	Rhyolitic tuff	25×18×13	SS43103851	P.M. 12/85

(A.M.=Abigail Madgett; B.M.=Barnaby Madgett; E.A.I.=Ann Inglis; P.M.=Paul Madgett.)

attempting a full description and interpretation of the Croyde–Saunton erratic suite.

With two exceptions the new finds either rest on the shore platform cut in Pilton Beds or are partially embedded in the modern beach deposits of sand and shingle. These exceptions are the boulder of rhyolitic tuff, referred to above, and a further gneiss boulder near the base of the low cliffs at Down End.

The lower surface of the tuff was embedded in a 'stony clay' deposit exposed on Croyde beach just seaward of the dunes to the north of the stream. The upper part of the boulder was enclosed by silty clay grading up into peaty clay; the junction between the silty clay and the 'stony clay' is sharp. The stratigraphic context of the erratic was unfortunately destroyed during dune stabilisation operations in 1983; it has since been removed to a nearby garden (contact authors for details).

Three large boulders of gneiss are now known to occur at Saunton Down End. One is Dewey's (1910) 'foliated granite'; another is an almost spherical boulder of contorted gneiss in a low-tide gully south-east of Chisel Beach (Keene, 1986). Both have smooth surfaces and are partly enclosed by modern beach deposits on the foreshore. The third, not previously reported, lies at the back of an embayment in the low cliffs of Down End. It is not far from Dewey's erratic (with which is has probably been confused in the past) but has a rough lichen-encrusted surface and is cemented to bedrock by raised beach sands. It is thus comparable to the Saunton 'red granite' (Williams, 1837) in its statigraphic context.

Much more interesting is the context of the Croyde Bay tuff. The only other large erratic partly enclosed by a similar 'stony clay' deposit is the granulitic gneiss (Hughes, 1887) on Baggy Point. This boulder rests on a planed surface of Pilton Beds. Slumping of 'head' in the present cliff seems to be the probable origin of the enclosing deposit. Raised beach sands are exposed (below 'head') at the base of the cliffs a few metres away, at the same height as the erratic. Therefore it seems likely that it too was originally in the same stratigraphic context as the Saunton granite.

In contrast the Croyde Bay tuff partially projected from the top of the 'stony clay'. The total thickness of the deposit at this point is not known, but no Pilton Beds exposures have been seen by the authors to the north of the stream, until the northern edge of the bay is reached. However, a continuous shore platform cut in these rocks extends under a veneer of modern sands and gravels from Cock Rock, just south of the stream, to Down End. The tuff certainly did not rest on such a bedrock surface.

The overlying silty and peaty clays probably represent alluvial and marsh deposits of the stream, deposited when the sand-dunes were to the west of their present position.

Thus the rhyolitic tuff boulder represents the first large erratic to have been discovered in the Croyde–Saunton area in a deposit other than raised beach or modern beach material. The authors have since confirmed Stephens' (1974, p. 40) observations of small erratics in the 'stony clay' of the low cliffs to the south of the stream. Stephens (1974) argued that the erratic content indicated that this deposit might be a till. However, not only do the beach exposures with the tuff erratic appear to represent a northern continuation of the deposits in these cliffs, but the top surface of the 'stony clay' in the cliffs, sporadically exposed below modern dunes in the southern half of the bay, raises gradually but continuously from the mouth of the stream to the solifluction terrace flanking the north side of Saunton Down (see map in Stephens, 1970). Therefore the present authors consider that the exposures of 'stony clay' to the north of the stream represent the distal portion of this solifluction terrace. Nevertheless the presence of erratics in these deposits is taken by the authors as supporting evidence for a former cover of till at higher levels in the Croyde area, now destroyed by periglacial and interglacial erosion. The Ramson Cliff epidiorite (Madgett and Madgett, 1974) may represent the last trace of such a cover at its former altitude.

Acknowledgements

To our respective families—Rosemary, Barnaby and Abigail Madgett, and Mike Inglis—for valuable help in the fieldwork, and for tolerance towards our activities;

to Professor C. Kidson and Peter Robinson for discussions in the field and correspondence on the significance of the erratics;

to Mike Ashton and Luton College of Higher Education Geology Section for the preparation of thin sections;

to Wendy Reid for typing the manuscript.

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