

Geological excursions in the Harlech Dome: classical areas of British geology

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Notes

- National Grid references, given in the form [SH 7140 2863] throughout, all lie within the 100-km square SH.
- Numbers preceded by E refer to thin sections in the collections of the British Geological Survey.

Preface

Every year hundreds of students of geology visit the Harlech dome. The only guide to this classical area of Cambrian geology has hitherto been a geological map at one inch to one mile published by C. A. Marley and T. S. Wilson in 1946. To meet the needs of these visitors, this book which supplements the recently published 1:50 000 Harlech geological sheet, provides detailed geological notes and large-scale maps of carefully selected excursions in the Harlech dome. In addition, geological notes

are provided (and a glossary of terms) for some of the more popular walks in the area, with the hope that they can be used by anyone with an interest in geology.

G. M. Brown Director. British Geological Survey Keyworth, Nottingham NG12 5GG. 4 January 1985.

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Glossary

Acidic	Relating to igneous rocks containing over 63 per cent silica
Altiplanation terrace	Hillside bench cut in solid rock and formed in periglacial conditions by processes involving solifluction and mass movement
Argillaceous	Relating to sediment composed of clay sized particles
Autoclastic breccia	A rock formed by mechanical crushing <i>in situ</i>
Basalt	Fine-grained, dark coloured igneous rock, usually extrusive, composed mainly of plagioclase in the labradorite to bytownite range and pyroxene
Base metal	Common chemically active metal; for example, lead, copper, zinc
Basic	Relating to igneous rocks with less than 52 per cent of silica
Benthonic	Relating to bottom-dwelling marine life
Bornite	Sulphide of copper and iron (Cu ₅ FeS ₄) with iridescent tarnish (Peacock Ore)

Boulder	Clay Glacial deposit consisting of unsorted boulders and pebbles in clay matrix. Synonymous with till
Brachiopod	Solitary marine invertebrate characterised by having two symmetrical but dissimilar shells or valves
Breccia	A coarse-grained elastic rock composed of angular rock fragments
Breccia pipe	Roughly cylindrical body of intrusive breccia
Caledonian orogeny	Name used for the orogenic belt (the Caledonides) stretching from Ireland through Britain to Scandinavia. Dated as end-Silurian but also used to include earlier pulses
Chalcopyrite	Bright brass-yellow ore mineral of copper (CuFeS_2)
Chronostratigraphy	Branch of stratigraphy which relates strata to time
Cleavage	Fissile structure in a rock produced by deformation or metamorphism which enables it to split into thin laminae along secondary aligned fractures
Comagmatic	Related to igneous rocks interpreted as having been derived from a common parent-magma
Contourite	Sedimentary rock deposited from a contour-following bottom current. Usually recognised as a layer of relatively coarse-grained sediment in marine muds or silts
Dolerite	Medium-grained, igneous intrusive rock of similar composition to basalt
Drumlin	Low, oval hill or ridge of glacial till built under the margin of the ice and shaped by its flow so that the longer axis is parallel with the direction of movement of the ice
Epiclastic	Related to a rock formed by the breakdown and consolidation of preexisting rocks
Fluvioglacial	Related to the deposits produced by meltwater streams flowing from a glacier
Fold	Bend of a planar structure in rocks, for example, bedding planes or cleavage
Fold axis	Line on a map which traces the crest or trough of a fold
Galena	Bluish grey ore mineral of lead (PbS)
Geosyncline	Large-scale downwarp in the surface of the earth in which thousands of metres of sedimentary and volcanic rocks accumulate
Graptolites	Extinct group of colonial marine animals with a corneous skeleton. In <i>Dicoonema</i> the colony formed a conical net
Greenschist facies	Low grade regional metamorphism corresponding to a temperature range of 300 to 500°C
Greywacke	An impure sandstone with more than 15 per cent interstitial matrix consisting of mica, chlorite and quartz. Grains include quartz, feldspar and lithic rock fragments
Head	Deposit consisting of locally derived unsorted material formed by solifluction usually under periglacial conditions
Hiatus	Break in continuity of the stratigraphic record either by erosion or non-deposition, and the time-value associated with this period
Hyaloclastite	A deposit formed by the rapid chilling of a lava or magma where it flows into water or saturated sediment causing it to shatter into small angular fragments
Hydrothermal alteration	The alteration of rocks or minerals by the action of hot water circulating underground

Hyolithid	Extinct group of molluscs with a narrowly conical lidded shell
Intermediate	Relating to igneous rocks containing 52 to 63 per cent silica
Intrusive breccia	Heterogeneous mixture of angular fragments which has been mobilised and intruded into its present position
Lapilli	Fragments between 2 and 64 mm in diameter ejected by a volcanic eruption
Lava breccia	Autoclastic breccia produced by the fragmentation of the upper and lower crusts of a lava during now
Lithostratigraphy	That part of stratigraphy which deals with the nature and composition of strata
Load cast	A sole mark or depression on the base of a bed caused by unequal settling and compaction of the overlying material
Magnetite	Ore mineral of iron (Fe_3O_4)
Mass-flow deposits (mud flow)	Deposit formed by mass-movement of soil and rock debris down a slope. May be triggered by earthquake or by oversaturation
Mass wasting	Dislodgement and downslope movement of soil and rock material under gravity. Includes processes such as solifluction, rock slides, soil creep and mass-flow
Microdiorite	Medium-grained intermediate igneous rock consisting of plagioclase in the oligoclase to andesine range. Other minerals may include augite, hornblende, biotite, hypersthene. Primary quartz is normally less than 5 per cent
Microgranite	Medium-grained acid igneous rock containing quartz and feldspar with some dark minerals which may include hornblende and biotite
Microtonalite	Medium-grained intermediate igneous rock of similar composition to microdiorite but containing more than 10 per cent primary quartz
Molybdenite	Lead-grey flaky molybdenum mineral (MoS_2)
Moraine	Debris eroded and redeposited by a glacier consisting of unsorted unstratified till. Lateral and terminal moraines are the deposits at the side and end of a glacier respectively
Oolith	Round or oval accretionary particle in a sedimentary rock (0.25 to 2 mm in diameter)
Orogeny	Process of formation of mountains
Pericline	A fold in the form of a dome or basin
Periglacial	Relating to the conditions and processes existing around the margins of a glacier or ice-sheet
Phenocryst	Large conspicuous crystal in a porphyritic rock
Porphyry	An igneous rock of any composition containing phenocrysts in a fine-grained groundmass
Porphyry copper	An ore deposit composed of a large body of rock containing small quantities of disseminated chalcopyrite and other sulphide mineral
Pyrite	Brass-yellow ore of iron known as 'fools gold' (FeS_2)
Pyrrhotite	Silver-yellow magnetic form of iron sulphide
Quartz-microdiorite	A form of microdiorite with between 5 and 10 per cent quartz
Quartz wacke	Impure sandstone containing more than 15 per cent detrital matrix (sericite and chlorite). Grains are mainly of quartz with less than 10 per cent feldspar and less than 10 per cent of rock fragments
Rhodochrosite	Pink or reddish ore of manganese (MnCO_3)

Solifluction	Downslope flow of waterlogged soil and other unsorted material
Spessartine	Red-brown to yellowish manganese aluminium silicate (variety of garnet)
Sphalerite	Yellowish brown to dark brown zinc ore (ZnS)
Subarkose	Sandstone with little detrital matrix (less than about 15 per cent) with grains predominantly of feldspar with less abundant lithic clasts and quartz
Subgreywacke	Sandstone with little detrital matrix (as in subarkose). Grains consist of quartz, rock fragments and feldspar. The proportion of rock fragments exceeds that of feldspar
Subduction	Process whereby one part of the earth's crust descends beneath another
Subvolcanic	Relating to intrusions and other phenomena in the basement beneath a volcano
Till	Synonymous with boulder clay
Trilobite	An extinct group of marine arthropods (class Trilobita) in which the exoskeleton was divided longitudinally into three lobes (Figure 20)
Tuff	A rock formed by the consolidation of volcanic ash
Tuffite	A mixed rock consisting of >25 per cent pyroclastic and >25 per cent epiclastic or detrital material
Turbidite	The consolidated deposit of a turbidity current. These rocks are characterised by graded bedding, moderate sorting and well developed sequence of bedding structures (Bouma cycle)
Xenolith	A foreign inclusion in an igneous rock

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