

# Major intrusions, Silurian and Devonian igneous activity, Midland Valley of Scotland

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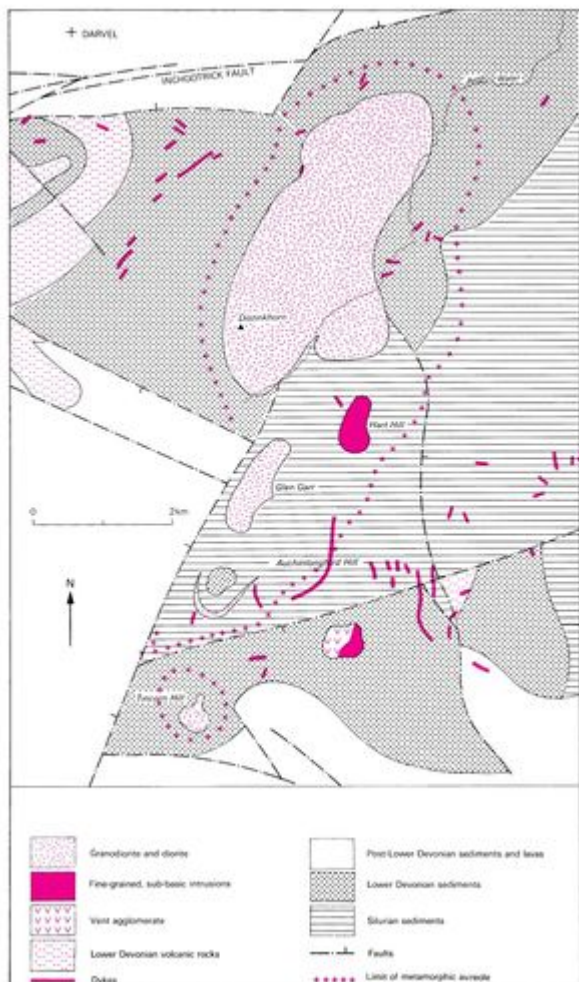
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## Major intrusions



Lower Devonian igneous rocks in the area

around Distinkhorn and Tinkhorn Hill, Ayrshire. P915525.

Several of the larger intrusions of the Midland Valley have plutonic characteristics and are surrounded by wide thermal metamorphic aureoles.

## **Distinkhorn and Tincorn Hill granodiorite-diorite complexes**

A group of poorly-exposed intrusions to the south-east of Darvel constitutes the only major representative of the Caledonian granodioritic plutonic suite in the Midland Valley , ([P915525](#)). The intrusions are small in comparison with those of the Highlands and Southern Uplands but rock types and field relationships are comparable. Three separate outcrops occur within a metamorphic aureole which extends NNE-SSW for 10 km in Silurian and Lower Devonian sandstones. Contacts with the sediments are not exposed but the width of the aureole (up to 1 km in places), relative to the size of the intrusion, suggests that they may dip outwards at a shallow angle.

The Distinkhorn and Glen Garr outcrops consist of pink or red hornblende' biotite-granodiorites and grey quartz-diorites or hypersthenediorites. The dioritic rocks occur on the eastern margins and have undergone contact metamorphism, presumably by the granodiorite. Contact-altered, fine-grained dioritic rocks also occur in a 1 km-wide intrusion on the east side of the aureole at Hart Hill. The Tincorn Hill complex consists of a variety of granodioritic and dioritic rocks, surrounded by a separate, 1 km-wide aureole in Lower Devonian sediments. A vent of agglomerate and dolerite at Auchinlongford may be a related feature.

Numerous basic to acid dykes and small sills of Lower Devonian age which cut baked sandstones in the aureole of the Distinkhorn mass have been subjected to varying degrees of contact metamorphism. Progressive recrystallisation in the dykes is accompanied by the development of epidote, chlorite, hornblende, biotite, augite and sphene with clouding of feldspar. The same phases are found in lesser amounts in the recrystallised sandstones and some tourmaline has been recorded.

## **Fore Burn dioritic complex**

The complex occupies an area of 2 km by 0.5 km within Lower Devonian andesites, basalts and sediments adjoining the Southern Upland Fault, 7 km south-east of Straiton. Varieties of quartz-diorite are predominant with younger intrusions of albitised porphyritic andesite. Adjacent sediments are highly baked and the lavas are epidotised. All the rocks of the complex and to

a lesser extent the contact-altered lavas and sediments are affected by tourmalinisation which is locally very intense. Apatite is commonly associated with the tourmaline and thin sulphide veins contain low-grade copper-arsenic- antimony mineralisation.

## **Lyne Water dioritic intrusion**

An outcrop of dioritic rocks cuts and bakes Lower Devonian conglomerates south-west of Wether Law in the Pentland Hills. Rocks of the intrusion are similar to those of other small masses regarded as Caledonian in the north-eastern Southern Uplands. The predominant rock type exposed is quartz-diorite becoming more basic and finer-grained south-eastwards towards a marginal porphyritic augite-andesite. In the north-west, granodiorite and microgranite outcrops suggest that a more extensive, granodioritic central part of the intrusion may be present beneath the unconformable Upper Devonian cover.

## **Dioritic stocks of the Ochil Hills**

Dioritic stocks cut Lower Devonian volcanic rocks at Tillicoultry, Glendevon and near Glenfarg.

At Tillicoultry four stocks, ranging from 200m to 1 km diameter, occur within a 6 km by 1 km thermal aureole. The stocks are cut by the Ochil Fault, by the late Carboniferous quartz-dolerite fault intrusion and by members of a contemporaneous radial dyke swarm. At Glendevon a 250m by 1 km stock and three small bosses occur within a 4 km by 1.5 km thermal aureole. Two small stocks occur at Newhill, west of Glenfarg and widespread areas of alteration elsewhere could indicate concealed intrusions. Some stocks have sharp, steep, outward-dipping intrusive margins, some have gradational, hybridised xenolithic contacts and others exhibit a ghost stratigraphy with scarp features conformable with the regional dip of the lavas. It may be concluded that the diorites were emplaced partly by simple intrusion and assimilation with radial fracturing of surrounding rocks, and partly by metasomatic replacement of country rock.

Rocks of the major intrusions are all classed as quartz-diorites but they are variable in colour, texture and mineralogy. Many of the radial dykes are similar in composition to the lavas, consisting of olivine-basalts, porphyritic pyroxene- and hornblende-andesites, trachyandesites and albitised equivalents. Within the diorites the dykes usually have irregular, gradational and unchilled contacts indicating near-contemporaneity. Many veins of pink aplite permeate the stocks and the altered rocks of the aureoles. Within the aureoles, altered lavas show a complete gradation from clouded and spotted rocks to hornfelses in which original texture has been obliterated and replaced by granoblastic aggregates of sodic plagioclase, quartz and biotite, often with pink porphyroblasts of alkali feldspar.

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