C5 Leusdon Common

[SX 704 729]

Highlights

Migmatization is very rare in association with Cornubian granites, and Leusdon Common probably shows the best available example. Exposures here, which are mostly of boulders, show mixtures of granite and metasediment in intimate relationship resulting from mobilization and plastic flow. They come from the roof and the uppermost wall of the Dartmoor intrusion, which is composed of coarse biotite granite.

Introduction

Leusdon Common is a small area of gorse-covered ground some 6 km north-west of Ashburton. Exposed on its southern slopes are small, separated outcrops and boulders of the country rocks of the Dartmoor Granite, illustrating the nature of the uppermost wall or lower roof of the intrusion, together with a narrow apophysis of fine-grained granite. Brief accounts of the rocks are given by Reid *et al.* (1912) and Dearman (1962).

Description

The main body of the granite underlying the high ground at Leusdon is coarse-grained megacrystic biotite granite (Dangerfield and Hawkes, 1981; Type B, (Table 5.1); Exley and Stone, 1982), of which the finer variety mentioned above is derivative. It too is megacrystic, at least in its uppermost 0.10 m, and it is *in situ.* It has given rise to spotted hornfelses at its contact, whereas the country/contact rocks found elsewhere on the site have a much more migmatitic aspect which is most unusual for Cornubian granite contacts. Cordierite is plentiful in the metamorphic rocks. Some boulders are composed of intermixed granite and sediment, and in other cases xenoliths in all stages of assimilation occur, some still showing original sedimentary banding and some being aligned. The granite in these cases is fine grained and varies from veins a centimetre or two thick to narrow, thread-like apophyses. These veinlets are often contorted and may penetrate into the metasediment, causing fragments to spall off. The metasediments also are often contorted.

Interpretation

These exposures exemplify some of the complex relationships between magma and country rocks involved in the emplacement by stoping of granite magmas. Although the mechanical effects are perhaps better shown at some Cornish contacts, for instance at Rinsey Cove, migmatization in such places is absent, as it is at two other Dartmoor roof contacts at Sharp Tor and Standon Hill. Neither is it prominent at the Burrator wall contact, although Brammall and Harwood (1932) referred to it in describing the changes brought about in Dartmoor Granite magma by the assimilation of Devonian metasediments.

The process of migmatite formation requires a combination of high temperature, high pressure and high volatile (especially water) content; it is, therefore, not commonly associated with high-level, relatively cool granites such as those in Cornubia, and there is no pattern in its occurrence here. The conclusion is that it took place in small, restricted regions near the upper parts of intrusions, where heat and water were locally concentrated, and that it may also have been connected with the potassium metasomatism which produced the megacrystic outer granites. Migmatiza-tion itself is of little consequence in the assimilation process discussed by Brammall and Harwood (1932), but the ramification of mobile granitic vein material, whether magmatic or migmatitic, was the chief stoping mechanism by which blocks of country rock were prised off to be engulfed by, and incorporated into, the granite magma.

Conclusions

There is no better site than Leusdon Common for the study of the complex relations between intrusion and country rock resulting from a combination of stoping and migmatization during emplacement of a Cornubian granite magma.

References

Type	Description	Texture	Minerals (approximate mean modal amounts in parentheses)						Other names in literature
			K-feldspar	Plagioclase	Quartz	Micas	Tourmaline	Other	
A	Basic microgranite	Medium to fine; ophitic to hypidiomorphic	(Amounts vary)	Oligoclase-andesine (amounts vary)	(Amounts vary)	Biotite predominant; some muscovite	Often present	Hornblende, apatite, zircon, ore, garnet	Basic segregations (Reid et al., 1912); Basic inclusions (Brammall and Harwood, 1923, 1926)
B	Coarse-grained megacrystic biotite granite	Medium to coarse; megacrysts 5-17 cm maximum, mean about 2 cm. Hypidiomorphic, granular	Euhedral to subhedral; microperthitic (32%)	Euhedral to subhedral. Often zoned: cores An_{25}-An_{30}, rims An_{8}-An_{15} (22%)	Irregular (34%)	Biotite, often in clusters (6%); muscovite (4%)	Euhedral to anhedral. Often zoned. 'Primary' (1%)	Zircon, ore, apatite, andalusite, etc. (total, 1%)	Includes: Giant or tor granite (Brammall, 1926; Brammall and Harwood, 1923, 1932) = big feldspar granite (Edmonds et al., 1968), coarse megacrystic granite (Hawkes and Dangerfield, 1978). Also blue or quarry granite (Brammall, 1926; Brammall and Harwood, 1923, 1932) = poorly megacrystic granite (Edmonds et al., 1968), coarse megacrystic granite (mesocrystic type) (Hawkes and Dangerfield, 1978), coarse megacrystic granite (small megacryst variant) (Dangerfield and Hawkes, 1981). Also medium-grained granite (Hawkes and Dangerfield, 1978), medium granites with few megacrysts and megacrysts very rare (Dangerfield and Hawkes, 1981). Biotite-muscovite granite (Richardson, 1923; Exley, 1959). Biotite granite, equigranular biotite granite, and globular quartz granite (Hill and Manning, 1987).
C	Fine-grained biotite granite	Medium to fine, sometimes megacrystic; hypidiomorphic to aplitic	Subhedral to anhedral; sometimes microperthitic (30%)	Euhedral to subhedral. Often zoned: cores An_{10}-An_{15} (26%)	Irregular (33%)	Biotite 3%; muscovite (7%)	Euhedral to anhedral. 'Primary' (1%)	Ore, andalusite, fluorite (total, <1%)	Fine granite, megacryst-rich and megacryst-poor types (Hawkes and Dangerfield, 1978; Dangerfield and Hawkes, 1981)
D	Megacrystic lithium-mica granite	Medium to coarse; megacrysts 1-8.5 cm, mean about 2 cm. Hypidiomorphic, granular	Euhedral to subhedral; microperthitic (27%)	Euhedral to subhedral. Unzoned, An_{7} (26%)	Irregular; some aggregates (36%)	Lithium-mica (6%)	Euhedral to anhedral 'Primary' (4%)	Fluorite, ore, apatite, topaz (total, 0.5%)	Lithionite granite (Richardson, 1923). Early lithionite granite (Exley, 1959). Porphyritic lithionite granite (Exley and Stone, 1964). Megacrystic lithium-mica granite (Exley and Stone, 1982)
E	Equigranular lithium-mica granite	Medium-grained; hypidiomorphic, granular	Anhedral to interstitial; microperthitic (24%)	Euhedral. Unzoned, An_{4} (32%)	Irregular; some aggregates (30%)	Lithium-mica (9%)	Euhedral to anhedral (1%)	Fluorite, apatite (total, 2%); topaz (3%)	Late lithionite granite (Exley, 1959). Non-porphyritic lithionite granite (Exley and Stone, 1964). Medium-grained, non-megacrystic lithium-mica granite (Hawkes and Dangerfield, 1978). Equigranular lithium-mica granite (Exley and Stone, 1982). Topaz granite (Hill and Manning, 1987)
F	Fluorite granite	Medium-grained; hypidiomorphic, granular	Sub-anhedral; microperthitic (27%)	Euhedral. Unzoned, An_{4} (34%)	Irregular (30%)	Muscovite (6%)	Absent	Fluorite (2%), topaz (1%), apatite (<1%)	Gilbertite granite (Richardson, 1923)

(Table 5.1) Petrographic summary of main granite types (based on Exley et al., 1983)