

Chapter 4

Intrusive Igneous Rocks

Classification and Distribution

The intrusive igneous rocks of the district comprise major intrusions of granodiorite and granite, and minor intrusions of porphyritic microgranite, feldsparphyric rhyolite, quartzphyric rhyolite and mafic dykes. Compositional classification is based on Le Maitre (1989) (Figure 8). On the basis of the nomenclature adopted for the 1:20 000 mapping programme (Strange, 1985), the major intrusives are divided according to textural characteristics into medium- and fine-grained lithologies. Recent detailed geochemical and mineralogical studies of the granites on Tsing Yi have revealed that the medium-grained granites are distinct from the Sha Tin and Needle Hill granites and probably represent a separate pluton. Considerable textural variation is shown by the minor intrusive rocks, particularly the feldsparphyric rhyolites. In some of the larger dykes, there is complete gradation from strongly feldsparphyric textures at the margins to porphyritic microgranite textures in the cores. Quartzphyric rhyolite dykes may also show textural variation from quartzphyric margins to feldsparphyric cores.

Major Intrusions

Granodiorite

Porphyritic medium- to fine-grained granodiorite is exposed in the northeastern and western parts of the district (Plate 6). The granodiorite is the oldest intrusive unit, although no absolute ages have been determined. The granodiorite is part of a large, sheet-like batholithic body known as Tai Po Granodiorite

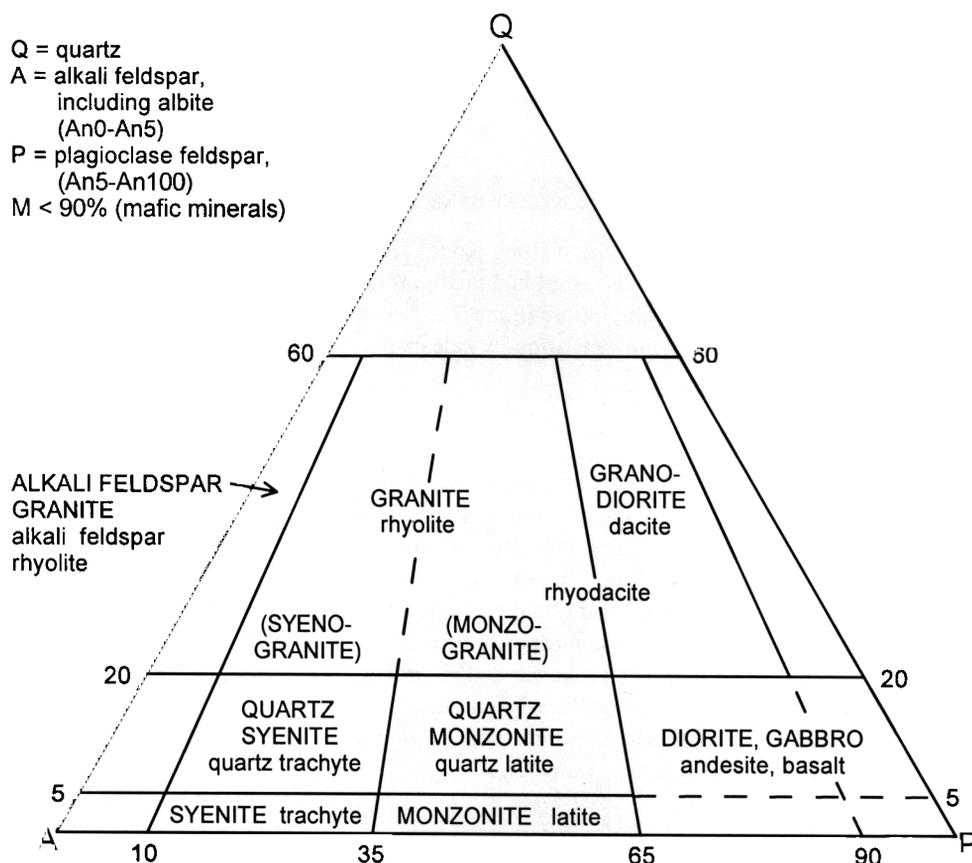
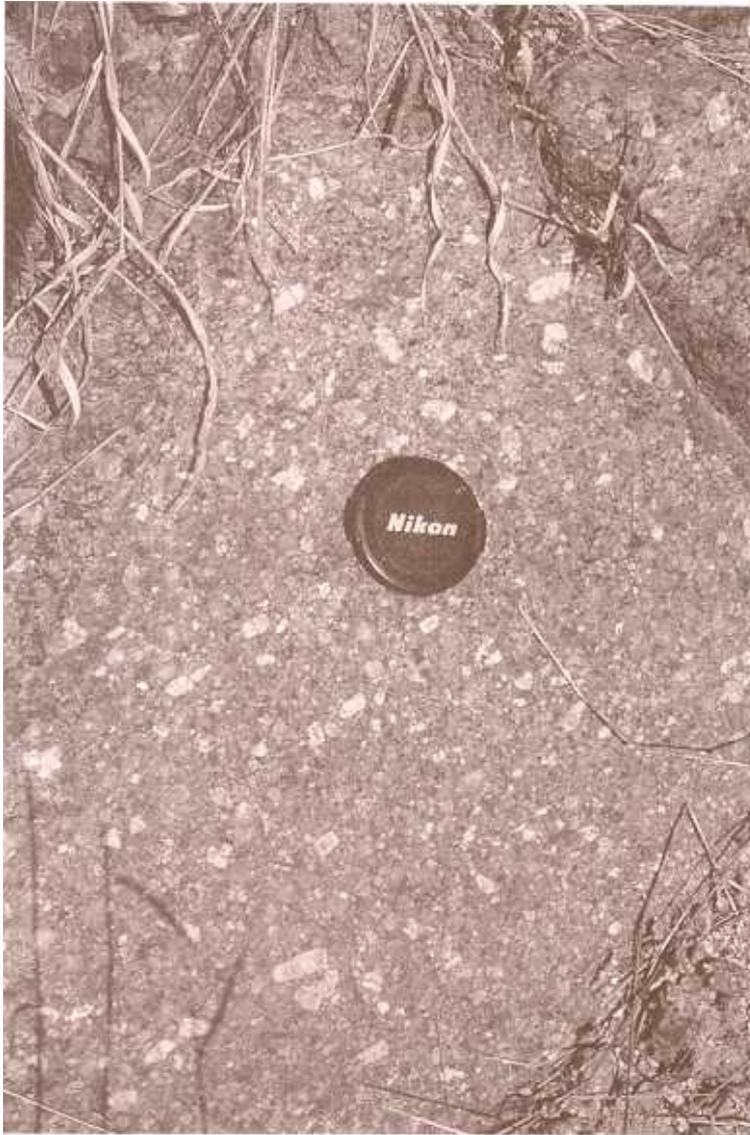


Figure 8 - Generalized Classification and Nomenclature of Selected Major and Minor Intrusive Rocks (after Le Maitre, 1989)



*Plate 6 -
Porphyritic Fine-grained Granodiorite Exposed at Tsing Yan
(2780 2430)*

which underlies much of central and southern Hong Kong. The granodiorite is typically porphyritic with large euhedral phenocrysts of alkali feldspar set in a medium- to fine-grained matrix of quartz, alkali feldspar, plagioclase, biotite, and minor amphibole (Plate 7). Accessory minerals include zircon, titanite and apatite. Compositionally, the granodiorite is strongly calcalkaline and varies from 63 to 68 wt% SiO₂.

Medium-grained Granite

The medium-grained granite of Tsing Yi are compositionally distinct from the Needle Hill and Sha Tin granites to the north and east. The Tsing Yi granite forms a subcircular pluton centred on Tsing Yi and is inferred to intrude the Sha Tin granite immediately to the east. In central Tsing Yi, the pluton intrudes the Tai Po granodiorite and rocks of the Tsuen Wan Volcanic Group. The Tsing Yi granite is intruded by the Needle Hill granite in the vicinity of Tsuen Wan to the northeast. Non-porphyritic medium-grained granite is the principal lithology in central and southern parts of the district (Plate 8), although porphyritic textures are well-developed close to the contact with tuff and in the southwest. The granite is characterised by equal proportions of quartz, alkali feldspar and plagioclase, with biotite as the chief mafic mineral. The medium-grained granite is deeply weathered in areas where the protective cover of tuff has been removed by erosion. Quartz- and feldspar-rich residual soils are the typical weathering products on the lower ridge crests of central and southern Tsing Yi.

Minor Intrusions

The minor intrusions of the district comprise feldsparphyric rhyolite, porphyritic microgranite, quartzphyric rhyolite, fine-grained granite and basalt. Most of the felsic dykes are oriented in a WSW-ENE direction, whereas the mafic dykes tend to be variably oriented.

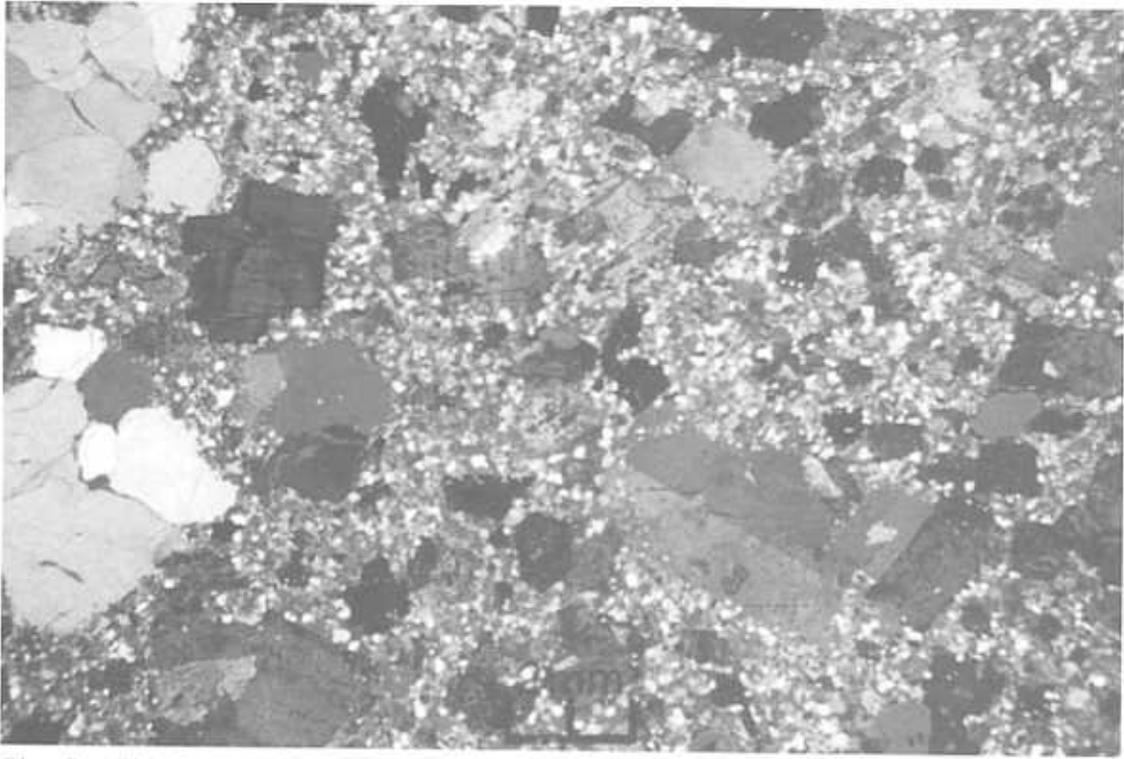


Plate 7 - Thin Section of Porphyritic Fine-grained Granodiorite from a Borehole at Kam Chung Kok (2726 2297); XPL.



Plate 8 - Medium-grained Granite Exposed at Nam Wan (2160 2778)

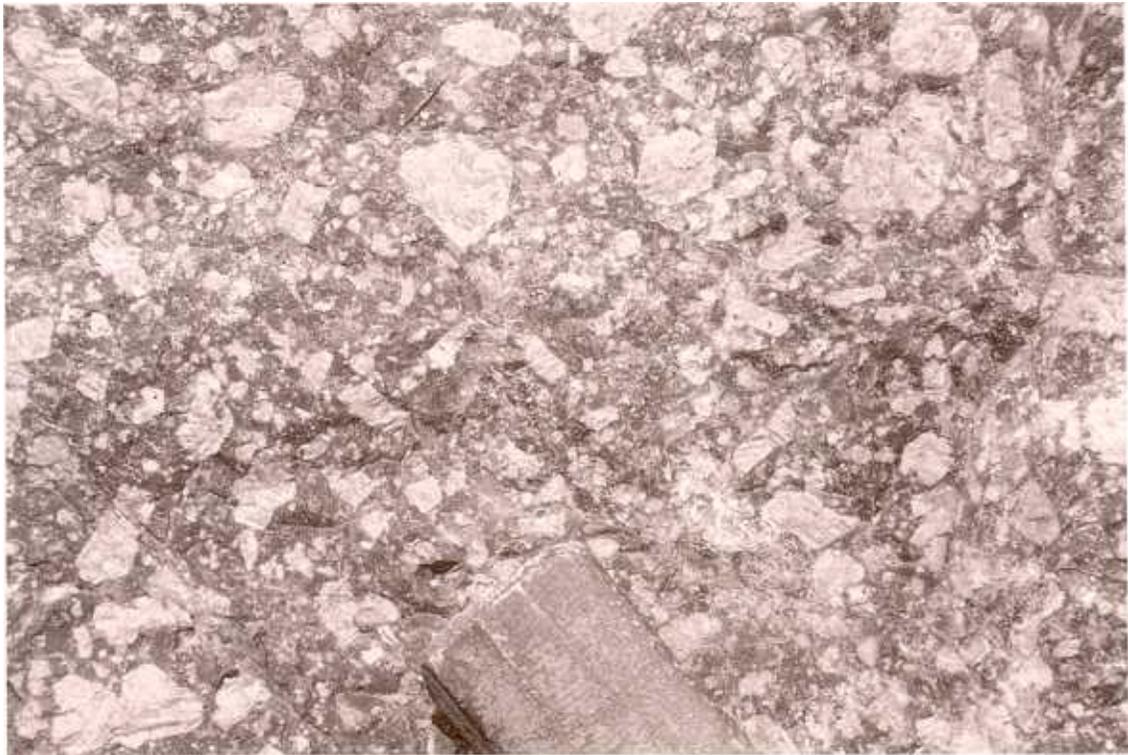


Plate 9 - Feldsparphyric Rhyolite Exposed at Sai Tso Wan (2756 2279), Hammer Head 2 cm.

Feldsparphyric Rhyolite

By far the commonest dyke rock encountered is feldsparphyric rhyolite (Plate 9). The dykes may be up to 5 m thick and may grade laterally into porphyritic microgranite. The margins of the dykes tend to be strongly porphyritic, whereas the more slowly-cooled interior is less porphyritic.

Porphyritic Microgranite

Porphyritic microgranite is a textural variant of feldsparphyric rhyolite but the matrix grainsize is coarser. In general, porphyritic microgranite dykes are wider than feldsparphyric rhyolite dykes and frequently exhibit prominent biotite phenocrysts in addition to feldspar and quartz.

Quartzphyric Rhyolite

Quartzphyric rhyolite dykes are mostly found in the central and northern parts of the district and post-date emplacement of the feldsparphyric and porphyritic microgranite dykes. These dykes commonly have flow-banded margins and may grade laterally into fine-grained granite. Quartz phenocrysts are typically bipyramidal.

Fine-grained Granite

Fine-grained granite occurs chiefly in dykes and sills intruding the older major intrusive bodies (Plate 10). In central Tsing Yi, a 20 m-thick fine-grained granite dyke fed a large sill along the interface between medium-grained granite and tuff of the Yim Tin Tsai Formation. The fine-grained granite is chemically similar to the Needle Hill granite and in thin section is characterised by granophyric textures. Accessory minerals include zircon, monazite, fluorite, and apatite.

Mafic Dykes

Mafic dykes are mostly of basaltic andesite composition and may be up to 7 m thick. A particularly prominent mafic dyke is present at the Tsing Ma Bridge anchorage site (Plate 11). It comprises a 7 m-thick, E-W trending basaltic andesite dyke with evidence of minor faulting along the margins. The mafic dykes form the youngest intrusions of the district, although they may be partly coeval with the quartzphyric rhyolite dykes. Absolute ages for the mafic dykes have still to be determined, although elsewhere in the Territory Chandy & Snelling (1971) reported K-Ar ages of around 65 Ma.



Plate 10 - Fine-grained Granite Sill Exposed above Tsing Yi Road West(2821 2258)



Plate 11 - Basaltic Dyke Exposed at the Site of the Tsing Ma Bridge Anchorage, Shek Wan (2700 2381)