10 Plutonism
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10.1 INTRODUCTION

The plutonic rocks are part of the Southeast Asian tin belt (Schwartz et al., 1995). More than 90% are granitic. The granitoids of Malaysia, Thailand and Myanmar have petrological and geochemical characters that permit them to be put into belts (Cobbing et al., 1992). They have been divided into three: Western province, Eastern province and Main Range province (Hutchison & Taylor, 1978; Beckinsale, 1979; Cobbing et al. 1986) (Fig 10.1).

The Main Range granites are concentrated mainly in Peninsular Malaysia but extend through Peninsular Thailand as far as the latitude of Bangkok. The Main Range and Eastern Belt granitoids of Peninsular Malaysia demonstrate distinctly different petrological and geochemical varieties. These provinces are separated by the Bentong-Raub suture (Hutchison, 1975). The Main Range granites have a more restricted composition (SiO$_2$ >65%) whereas the Eastern Belt granitoids are compositionally expanded, SiO$_2$ ranging from 50 to 78%. The granites that have been responsible for the tin mineralization are exclusively of S-type, formed by collision of continental lithosphere. The Eastern and Central belts consist of both I and S type granitoids. In contrast to the Western Belt, some of the complexes and plutons of the Eastern Belt contain mafic to intermediate plutonic rocks that are closely spatially related to the granitic plutons. The mafic rocks constitute less than 5% of the total exposed plutonic areas. They are marginal to the granitic plutons, as well as syenitic and dolerite dykes that are intrusively related to the granitic plutons. The mafic rocks constitute less than 5% of the total exposed plutonic areas. They are marginal to the granitic plutons, as well as syenitic and dolerite dykes mainly of dolerite composition. In this chapter the plutonic rocks will be divided into three: (1) The Main Range, (2) the Eastern Belt, and (3) Cretaceous plutonic rocks. The distribution of the Peninsular Malaysian granitic plutons and associated rocks is shown in Fig.10.2.

10.2 GEOCHRONOLOGY

Geochronological studies of the granitoid batholiths were initiated by the Institute of Geological Sciences (IGS) of London in 1974 and the results of the Rb-Sr and K-Ar work were published by Bignell and Snelling (1977). Bignell (1972) carried out the field work and subsequent laboratory analyses for his D.Phil. thesis. The striking feature of all west Coast Province granites is the large discrepancies between K-Ar mica age, Rb-Sr whole rock isochrons and the U-Pb zircon ages. The K-Ar data give a wide range between 40 to 210 Ma in contrast to the Rb-Sr and U-Pb data, which give Late Triassic ages (200 to 230 Ma) (Bignell & Snelling 1977, Liew 1983, Darbyshire 1988). The absence of K–Ar ages older than 210 Ma was interpreted to be the result of Ar loss caused by Late Triassic intrusions and young fault-related disturbance (Bignell & Snelling 1977). A summary of the geochronology of the Peninsula is shown in Table 10.1.

10.2.1 Main Range Granite

The ages of 207–230 Ma are in agreement with the results of Bignell & Snelling (1977), Liew (1983) and Darbyshire (1988). The high initial 87Sr/86Sr ratios are in agreement with the S–type characteristics. The initial ratios range from 0.71 to 0.73 as shown in Fig. 10.3, from Hutchison (2007), using the data of Cobbing et al.(1992).

However there are also some younger granitic rocks in the western part of the Main Range, for instance the Gunung Jerai Granite of Kedah Peak. Analyses of different rock types in this pluton gave an age no more than 135 ± 6 Ma. Biotite and muscovite from the Jerai Granite have been dated using the K–Ar method to give an age of 47 ± 3 Ma and 59 ± 3 respectively (Bignell & Snelling 1977). The oldest component of this