Geol. Soc. Malaysia, Bull. 8, December 1977, pp 121–122

Age relationship between the Kuantan basalt and dolerite dykes – field evidence

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The age relationship between the Kuantan basalt and the dolerite dykes has recently received much attention. Fitch (1952) suggested that the dolerite dykes found in the locality were feeder dykes of the basalt flow that overlie acid plutonic rocks. Later, work by Bignell (1972) disproved Fitch's earlier suggestion. He found one dolerite dyke from Tg. Tembeleng by K-Ar radiometric dating to be at least 111 ± 4 m.y. In addition, recent palaeomagnetic studies by Haile (1974) supported Bignell's result. The basalt had a reverse sense of magnetization with respect to the present day field, corresponding to the Matuyama Reverse Epoch. A remanent magnetism more or less opposite to the basalt was recorded from the dolerite. Abdul Hanif Hussein (1974) analysed samples of dolerite and basalt and found that they are chemically different. He found that the dolerite should be classified into the olivine tholeiite group and basalt into alkalic olivine basalt and basanite. These studies evidently indicate that not all the basic igneous activities are contemporaneous. In this note, field evidence will be provided to show that one such dolerite is probably much older than the basalt.

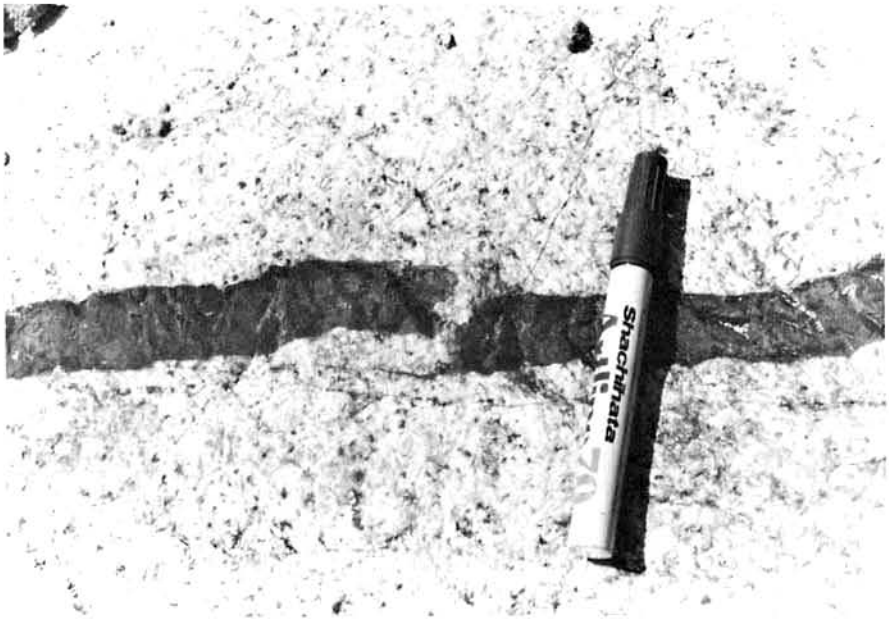
Recently the author visited the quarry at Bt. Ubi. The rock quarried are mainly adamellite with small amounts of rhyolite and the whole acid rock body is cut by numerous dolerite dykes and veins. However, one such dolerite dyke provided interesting evidence relating to age relationship.

The dolerite dyke (Fig. 1) is about 3 cm thick. It is locally cut by the adamellite and there is no evidence of brecciation at the structure. This feature can be explained in two ways:

(i) The dolerite might have intruded the solidified adamellite, and the heat of the basic igneous magma could have partially melted the adamellite. The molten acid rock could then intrude into the dolerite producing an effect known as back-veining.

(ii) The dolerite might have intruded the adamellite when the adamellite was still hot and plastic, and early shears which displaced the dolerite could be annealed by the hot and plastic adamellite. In other words, the dolerite dyke is synplutonic.

In the author's opinion, it is quite unlikely that the 3 cm thick dyke will be able to melt the solid acid rock. The author believes that the adamellite intrusion was followed closely by the dolerite while the former was still hot and plastic and that the ages of the dolerite and adamellite are contemporaneous.



Acid intrusions of Cenozoic or younger ages have not been found in the East Coast and therefore it appears that the dolerite dyke here is much older than the unconformable basalt dated to be 1.6 my by Bignell (1972) and evidently cannot be a feeder dyke of the basalt.

Therefore field relationship can be useful in providing clues to solve the problem.

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