Metamorphic Episodes of the Western Foothills of Gunung Ledang (Mt. Ophir), Johore-Malacca

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The western foothills of Gunung Ledang are underlain by two stratified units - a predominantly pelitic unit and calcareous unit. The calcareous unit is represented by metamorphosed tuffaceous rocks, calc-silicate hornfelses and minor marble, amphibolite and pelitic hornfels layers. The former unit is made up of spotted and non-spotted pelitic hornfelses with minor interbeds of metamorphosed tuffaceous rocks, and calc-silicate hornfelses. These rocks are intruded by the Belading granite on the west and the late Cretaceous Ledang granite on the east.

The granitic intrusions have thermally metamorphosed the rocks, probably throughout the whole area. Thermal metamorphism of the pelitic rocks gives rise to the development of biotite, andalusite, cordierite and sillimanite. The calcareous unit developed wollastonite, diopside, plagioclase, forsterite, phlogopite and prehnite. In more basic varieties, hornblende is common, usually with some biotite. The Belading granite has a well-developed thermal aureole and in the area the Ledang granite appears to have a well-developed thermal aureole as well. The two aureoles appear to coalesce at the southern part of the area.

Superimposed on the thermal metamorphism of the calcareous unit which occurs adjacent to both granites are metasomatic aureoles. Late metasomatic minerals such as lime garnet, scapolite and vesuvianite are well-developed in the calc-silicate rocks and in the marble chondrodite developed.

There is also evidence of an early pre-granite episode of regional metamorphism. Relict cleavages are sometimes present in the calc-silicate rocks and in rocks which have not developed thermal or metasomatic minerals schistose fabric can be seen. Also rock fragments in metatuffs are often ellipsoidal or elongated and show preferred orientation. The lack of relict minerals gives an impression that the early regional metamorphism is of a low grade.

The age of the rocks is uncertain. They may be equivalent to the Middle to Upper Triassic Gemas Beds occurring just north of the area. If this is true, the regional metamorphism cannot be earlier than Triassic.

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