THE STRUCTURAL PETROLOGY

of an area

EAST OF SPRINGTON, SOUTH AUSTRALIA

by

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SUMMARY.

The structure and petrology of 50 square miles of folded and metamorphosed early Palaeozoic sediments on the eastern edge of the Mount Lofty Ranges, 40 miles east-north-east of Adelaide, South Australia, have been studied in detail. The purpose of this investigation has been to ascertain the character of the metamorphism and the time relation of metamorphism to deformation in the eastern portion of the Mount Lofty Range metamorphic belt. The rock units, showing a wide range of chemical variety, have been demonstrated to cross the metamorphic zones from the biotite zone to the sillimanite-potash felspar zone.

A variety of sedimentation structures have been recognised within the rock sequence.

Zonation of the metamorphism has been achieved through the establishment of metamorphic mineral facies boundaries. The metamorphism is of the low to intermediate pressure andalusite-staurolite-cordierite-sillimanite type. The appearance of kyanite along with andalusite and sillimanite in the aluminous pelitic schists on the western edge of the area, and the apparent repression of a number of metamorphic reactions releasing volatile components in the associated rocks, suggests that pressures were higher in the western part of the area during metamorphism. The progressive metamorphism of quartzo-
felspathic schists, pelitic schists, aluminous pelitic schists, cordierite and anthophyllite schists, marbles and calc-silicate rocks is described and various metamorphic mineral reactions are discussed. An optical study has been conducted on the plagioclase-epidote equilibrium relations in calc-silicate rocks.

Metamorphic segregation veins are common throughout the whole area.

A number of rocks of metasomatic origin have been described. Of these, fine-grained quartz-albite rocks replacing quartzo-felspathic schists, marbles and calc-silicate rocks are the most abundant. Narrow zones of quartz-potash felspar rocks on the western edge of the area are closely associated with potash deficient schists containing anthophyllite, chlorite and minor muscovite in place of the biotite and potash felspar of the normal quartzo-felspathic schists.

A variety of intrusive rocks in the form of small widely distributed bodies include dolerites, diorites, syenites and granodiorites. Swarms of aplite and pegmatite dykes appear to have been derived from the granodiorites.

Two phases of folding are recognised, the earlier having slaty cleavage as axial surface and the later crenulation cleavage as axial surface. Two apparently coeval crenulation cleavages of differing orientation are found in different
parts of the area. Petrofabric studies were conducted on quartz, calcite, mica and cordierite.

A study of porphyroblast growth has indicated that metamorphism occurred throughout, and outlasted, the two phases of folding.

In the dying stages of metamorphism a compound fault system displaced the metamorphic mineral isograds. The recently active Milendella Fault is considered to have a complex history commencing in Palaeozoic times.