

support the concept of continuous thickening, and it is conceivable that in Lower Mesozoic times in southern New Zealand there were more or less separate troughs of deposition for the two sedimentary facies.

An upper limit to the date of metamorphism and of erosion deep enough to expose chlorite-zone schists is provided by the deposition of the Kyebrun and Henley formations, the basal members of which may be as old as Upper Jurassic and Lower Cretaceous, respectively (HARRINGTON, 1955). By this time, according to the concept of WELLMAN (1956, pp. 13, 31), new geosynclines were forming on the east side of the North Island and in the north-east part of the South Island to the east of the now firmly indurated welt of older geosynclinal sediments. Pebbles and grains of quartz-sericite-pumpellyite semi-schist in conglomerates and greywackes of probable Lower Cretaceous age (D. HAMILTON, personal communication) in the Hurunui Gorge area are evidence that in North Canterbury the older geosynclinal sediments were providing low grade metamorphic material to a trough in which younger greywacke suites were being deposited.

Similarly, low-grade metamorphics such as actinolitic metavolcanics and quartz-sericite semi-schists are not uncommon as fragments in the Triassic and Jurassic greywackes and conglomerates of Southland. WOOD (1953, 1956), has given evidence from northern Southland for at least three "marginal unconformities" (i.e. marginal to the New Zealand Geosyncline), which exposed successively younger members of the Permo-Triassic sequence to erosion. None of these breaks can be correlated with a general orogeny and metamorphism, but, at least in the case of the break between the Waipahi and Arthurton groups (Permian), the effects extended far from the margins of the geosyncline as is shown by the emplacement at Otama of an igneous complex (described later) which is interpreted as a crudely sheet-like mass nearly 4 miles thick.

Difficulties in unravelling the history of the New Zealand Geosyncline arise from the monotonous uniformity of extraordinarily thick and sparsely fossiliferous greywacke suites, known to range in age from Permian to Cretaceous and commonly preserving general uniformity of strike. The present writer considers that evidence for unrest throughout the mobile belt of the New Zealand Geosyncline is likely to increase with the passage of the years and that the concept of continuous sedimentation, with thickening towards the axis of the geosyncline, is likely to prove at best an over simplification. It is suggested that the locus of most rapid sedimentation may have migrated repeatedly, as indeed it has during New Zealand's later history, and that the metamorphic maximum was not reached simultaneously at all points. The main significance of this interpretation, as far as the present paper is concerned, is that an unchallengable transition from the zeolite facies to typical greenschist facies rocks cannot yet be demonstrated for any one section, nor is it yet possible to state with any great accuracy the depths of cover under which chlorite-zone and higher grade metamorphism occurred. Nevertheless numerous sections of vast thickness are available for study as described below, some of them uncomplicated by unconformities, igneous intrusions or structural disturbance, and from these the general trend of a metamorphic sequence from the zeolite facies through a very broad zone characterized by prehnite and pumpellyite, to the greenschist and hence to higher facies, seems clear.