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THE GEOLOGY
OF
WANGANUI SUBDIVISION

By
C. A. FLEMING
N.Z. Geological Survey



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GEOLOGICAL MAPS AND SECTIONS

(in portfolio)

- Geological Map, Wanganui Sheet.
- Geological Map, Waverley Sheet.
- Geological Cross Sections, Wanganui Subdivision.
- Coastal Sections, Waverley Sheet.

All the foregoing groups are marine sediments deposited conformably in shallow to moderate depths. The Maxwell Group (325 to 1,450 ft) consists of paralic sediments deposited partly on land and partly in coastal estuaries ; they consist of sand, silt, shellbeds, and pollen-bearing lignite indicating a fluctuating cool climate.

The Okehu Group (125 to 450 ft), locally unconformable, marks renewed marine transgression and is characterized by pumiceous sand, conglomerate, and silt ; its rather impoverished mollusc fauna is the basis of the Okehuan Substage of the Castlecliffian Stage. The Kai-iwi Group (250 to 1,500 + ft) consists of a basal pumiceous formation and six thin marine formations (of sandstone, siltstone, and shellbeds) resulting from cyclic sedimentation off a fluctuating shoreline ; the faunas are transitional between the two Castlecliffian substages. The Shakespeare Group comprises eleven similar marine fossiliferous formations deposited in rapidly changing environments, classified in the Putikian Substage of the Castlecliffian. The faunas show evidence of warm sea temperatures.

Rocks of the Hawera Series (Pleistocene) form the Pouakai Group, which contains marine, aeolian, terrestrial, and alluvial sediments, deposited unconformably on gently folded formations of the Wanganui Series. Ironsand, ash, and volcanic pebbles, from the Taranaki and Tongariro volcanoes, are important sediments. Marine faunas allow separation of an earlier Terangian and later Oturian Stage. The oldest formation of the Pouakai Group (Kaiatea) forms an alluvial cover on high-level, tilted terraces. The succeeding Brunswick and Rapanui formations, capping two coastal benches, include sequences of marine, alluvial, terrestrial, and aeolian beds, deposited during eustatic and diastrophic fluctuations of the strand, and recording a complex history of volcanism in nearby areas. Other Pouakai formations comprise river alluvium containing volcanic breccia attributed to mud-flows from the Tongariro volcanoes.

The Recent Series contains river alluvium, volcanic ash, dune-sand, beach sand, submerged forests, and other superficial deposits. The Taupo Pumice Alluvium, in the Wanganui Valley, is attributed to aggradation following eruption of the widespread Taupo Shower. The Patea Dune-sand is the product of successive advances of dune-sand on the coastal lowlands.

CHAPTER 4 : STRUCTURE.—Previous interpretations of structure are reviewed in the light of evidence provided by exposed rocks, faults, variation in thickness of sediments, gravity anomalies, and seismic refraction surveys. The structure of adjacent regions assists interpretation of local structure. The Wanganui Basin, an approximately equidimensional structure set between growing anticlines of north-eastward trend, is inferred to have developed during the late Tertiary Kaikoura Revolution and to have received abundant synorogenic sediments with a maximum thickness exceeding 12,000 ft. The basin occupies an area of negative gravity anomaly (maximum anomaly 165 milligals) centred near the mouth of Turakina River. The east-west diameter of this structure (which implies a crustal down-buckling or "tectogene") lies athwart the plunging nose of the chief South Island anticlinal fold, and separates it from the Taupo - White Island Volcanic Zone. An interpretation of these structures in terms of an island-arc of East and West Indies type is rejected. The three structures (geanticline, basin, and volcanic zone) are segments in a single zone of crustal weakness.

CHAPTER 5 : GEOLOGICAL HISTORY.—The succession of events in the post-Miocene history of the subdivision includes complex and rapid changes in paleogeography, sedimentation, volcanic and diastrophic activity, fauna, flora, and climate. Diastrophic movement (the Kaikoura Revolution) occurred throughout the period of establishment and growth of the Wanganui Basin. Sediments varied in amount and in nature according to provenance, relief of hinterland, and volcanism. Shorelines fluctuated in response to variation in quantity of sediment, and amount of subsidence and elevation. Phases of volcanic activity in the Taupo area, at Tongariro, and in Taranaki, left distinctive sediments.

THE GEOLOGY OF WANGANUI SUBDIVISION

CHAPTER 1—GENERAL INFORMATION

INTRODUCTION

THE town of Wanganui, on the north of Cook Strait, at the mouth of Wanganui River, is 95 miles north of Wellington. The name Wanganui Subdivision is used for the district shown on Waverley and Wanganui sheets of the 1 mile series of topographic maps, issued by the Department of Lands and Survey (Wellington, 1943). The meridional boundary between Waverley Sheet on the west, and Wanganui Sheet on the east, passes through the town of Wanganui, which thus occupies a central position in the subdivision.

FIELD WORK AND ACKNOWLEDGMENTS

The writer was in the field from January to April 1945, from December 1945 to April 1946, in March and April 1947, and in January and February 1948. He was assisted during the first two seasons by Mr A. C. Beck, then a student at Otago University. Dr J. Marwick, Chief Paleontologist, visited the subdivision in March 1945 and in March 1947; he assisted with the mapping and collecting of fossils. Mr A. W. B. Powell, Auckland War Memorial Museum, paid a visit in March 1945 to discuss paleoecological problems in the field. In December 1945 the writer accompanied Mr M. T. Te Punga, Department of Geology, Victoria University College, on a visit to the adjacent Rangitikei district to enable correlation to be made with the rock units of that area (Te Punga, 1952).

The first field-season was spent in mapping the coastal ironsand deposits and in studying the coastal section of Pliocene rocks between Castlecliff and the Waitotara River. In 1945-46, the mapping was extended inland from Wanganui to the northern boundary of the subdivision; in March and April 1947 the west half of Waverley Sheet was mapped from Waitotara and Waverley; and in 1947-48, the east half of Wanganui Sheet was mapped from Turakina, Fordell, Mangamahu, and Hunterville. The information on the published map sheets was supplemented by the use of air photographs chiefly in the coastal districts.

Throughout the period of fieldwork, the trustees of the Wanganui Public Museum kindly made available a room for draughting, and facilities for sorting and packing specimens. The late Mr J. Grant, then Hon. Director, and the late Mr Geo. Shepherd, then Curator, took a keen interest in the survey and assisted the work in every way. To Mr T. Smith, the writer is grateful for help and information freely given from his long experience in the Wanganui district. Several important fossil localities were located through the enthusiasm of Mr Emile Fromant, Kai-iwi Beach, and many other residents helped in ways too numerous to mention individually. The writer is pleased to acknowledge his indebtedness to the reports and maps of Superior Oil Company (N.Z.) Ltd.