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Age of the Hawks Crag Breccia

GEOFFREY NORRIS and J. B. WATERHOUSE

Department of Geology, University of Toronto, Canada

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Abstract

THE age of the Hawks Crag Breccia has long been in doubt. Age determinations for this formation have ranged from Triassic to Miocene using various methods—stratigraphy, structural relationships, paleontology, palynology, and radiometry. Recent palynologic studies of the Australian Mesozoic allow a more critical evaluation of the New Zealand rocks, suggesting that the Hawks Crag Breccia was deposited in the late Albian just prior to the arrival of angiosperms in New Zealand. This age supports the Cretaceous age assigned by radiometry (Aronson, 1965) to Westland granites.

INTRODUCTION

THE Hawks Crag Breccia is a formation lying west of the Southern Alps and composed of sandstones and bouldery breccia up to 2,000ft thick. It was probably deposited by torrential streams flowing from the front of a mountain range (Haast, 1861; Morgan and Bartrum, 1915; Henderson, 1917, 1929; Gage, 1948). Uranium has been found as coffinite layers and in granite boulders (Beck, Reed, and Willett, 1958; Wodzicki, 1959).

Because the formation is terrestrial it has been difficult to fit in with the remainder of the largely marine sequences of New Zealand. These marine sequences have been gradually pieced together by Marshall (1912), Thomson (1917), Cotton (1955), and Lillie (1951) into a model of two sedimentary systems separated by an unconformity. Upper Paleozoic and Triassic–Jurassic (= Hokonui) sediments were grouped into one great sedimentary system, and Middle Cretaceous and Tertiary beds were grouped into a second sedimentary system called the Notocene by Thomson (1917) and Notocenozoic by Cotton (1955). The Hokonui System and older rocks were deformed by an early Cretaceous orogeny, called the post-Hokonui Orogeny, and renamed the Rangitata Orogeny by Kingma (1959), following Park (1921). Speculations were of course offered on the Hawks Crag Breccia, and its possible significance in the overall scheme, but these were always hampered by the rather tenuous character of the evidence on which the age and correlations were based. Lamprophyre dykes were noted by Morgan and Bartrum (1915), supposedly suggestive of a Cretaceous age; whereas the syntectonic nature of the sediment suggested an early Tertiary age to Henderson (1917; 1929). Ongley (1939) noted lithological similarity to the Henley and Taieri breccias of east Otago, but the age of these beds was equally enigmatic. A Hokonui (?Triassic) age was preferred by Hector (*in* McKay, 1877, 1878) for underlying beds on the

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