

GEOLOGICAL DEVELOPMENT OF THE KIMBERLEY LANDSCAPE

Dr Tim Griffin opened his talk on 17 May 1995 by defining the role of his employer, the Geological Survey of Western Australia, which promotes mining and assists with the general development of the State. Part of this role involves facilitating access to the land whilst paying due attention to environmental and Aboriginal concerns. Tim's work involves producing geological maps which are reviewed every ten to twenty years as new data are collected. His aim in delivering the talk was to kindle our enthusiasm for the more subtle aspects of the Kimberley landscape—an easy task with an audience of Kimberley lovers.

Tim started at the beginning of time, stating that the earth is believed to be 4,500 million years old, i.e. 4,500 Ma and that some of the oldest rocks, at 3,500 Ma, are found in the Pilbara. The Yilgam craton of granite-greenstone is older than 2,500 Ma. The Survey uses chemical analysis and single crystals of zircon to date these rocks, which are known as Archean rocks.

We saw many slides of diagrammatic geological models and field examples as Tim explained that rocks determine the landscape according to their age, how they were formed, and how they have since eroded. Vegetation variations reflect differences in soils formed from the underlying bedrock.

The flat-lying sandstones and siltstones of the Kimberley Basin are Early Proterozoic in age (c. 1,800 Ma) and are generally undeformed. The whole of the Kimberley Basin is underlain by the Hart Dolerite that intruded as sheets of mafic magma up to 3 km thick. Uplift and erosion of these rocks has given rise to the open valleys and flat top hills of the Kimberley plateau country. The Hart Dolerite is characterised by black bouldery hills in the broad open valleys. To the east and west of the extensive area of Kimberley Basin sedimentary rocks are the eroded remnants of major mountain building zones known as the King Leopold Orogen and the Halls Creek Orogen. These areas contain slightly older metamorphic rocks and coarse-grained granites that form the foothills around the strongly deformed margin of the Kimberley Plateau.

Our trip through time allowed for a brief introduction to the Middle Proterozoic—with a discussion of the diamond-bearing diatreme (pipe) at Argyle, age 1,100 Ma—and some comments on the age of continents (which are old) and oceans (which are young). The information that the Australian continent is travelling north at the rate of a few centimetres a year prompted some speculative comments from members of the audience, and there were many intriguing questions posed when Tim finished his interesting presentation.

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