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SUMMARY OF REGIONAL SURVEY OF THE COTTER RIVER AREA, CARRIED OUT BY STUDENT GEOLOGISTS, W.J. ORME, AND H.M. HARRIS.

by

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Geologist

CANBERRA, A.C.T. 17th June, 1948.

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I. INTRODUCTION.

This work was undertaken to extend regional mapping in the central and western portions of the A.C.T. and to provide a geological map of the Cotter River Area for use in engineering investigations. The regional geology of portion of the Cotter Valley between Gingera and Bull's Head had previously been mapped on a scale of ½ mile to the inch, and this map was extended, by the recent survey, northwards to the Territory border and north-easterly to the Murrumbidgee River.

The field work was carried out by two student geologists, Messrs. Orme and Harris, who mapped an area of approximately 180 square miles between mid-January and the end of February, 1948. From their field work, the students compiled a geological map, on a scale of ½ mile to an inch, covering the north-western corner of the Territory-west of the Murrumbidgee River and north of Mt. Tidbinbilla. This work has added considerably to our knowledge of the geology of the Territory, and has provided a regional plan of the Lower Cotter Valley.

II. Field Methods.

Geological information was plotted in the field on to feature maps, on a scale of 20 chains to the inch. Air photographs were used to aid in fixing points on the feature maps, and, as a guide to general geology. A skeleton map was first produced by plotting all geological boundaries exposed along established roads. From this information and from air photos, traverses, by jeep and by foot, were planned to map areas of geological importance between the established roads. Plans of roads and plantations provided by the Forestry Department also proved very useful.

III. General Geology.

A. Metamorphic Rocks.

(1) The Franklin Formation.

The Franklin Formation, previously named and described in the Upper Cotter Valley, has been followed to the north to the boundary of the Territory. The formation consists of phyllite quartzite and metamorphosed tuffs. The beds strike approximately north-south, and dip steeply to the east or west. They have been intruded by granite and porphyry and are probably the oldest rocks in the area. No fossils were found in the formation to confirm its age, but the beds probably belong in the Upper Ordovician.

The western boundary of the formation has not been mapped in the south, but in the north it is bounded by volcanic rocks. In the south, the formation abuts on the eastern side against the Tidbinbilla Quartzite along the Cotter Fault, but this contact has not been followed in the immediate north, due to the rugged nature of the Cotter Valley. Farther north, the Franklin Formation is bounded by porphyry on the east from Lee's Creek to the Territory boundary.

(2) Other Metamorphic Rocks.

Previous geological work in the Upper Cotter Valley has established two formations east of the Cotter Fault - the

Kangaroo Creek Formation and the Tidbinbilla Quartzite. The Kangaroo Creek Formation is the older of the two, and consists of folded quartzite, tuff and shale which outcrop on the lower slopes of the valley. The Tidbinbilla Quartzite outcrops along the divide at Mt. Tidbinbilla and to the south and unconformably overly the Kangaroo Creek Formation.

In the recent survey, outcrops of metamorphic rocks have been mapped in several places, north of Mt. Tidbinbilla, between the Cotter and Murrumbidgee Rivers. These metamorphics occur, for the most part, as roof pendants to the Tharwa granite. In most places, they dip to the west and consist of quartzite, indurated shale and hornfels. However, these rocks have not been differentiated on the map, and probably contain representatives of both the Tidbinbilla Quartzite and the Kangaroo Creek Formation.

In the Cotter Valley, in the vicinity of Mount Tidbinbilla, the metamorphic rocks consist of Tidbinbilla quartzite, bounded by the Cotter fault in the west, and by the Tharwa granite in the east. A narrow belt of metamorphic rocks has been mapped north of Mount Tidbinbilla, through Hardy's Trig to Pierce's Creek, but the rocks exposed at the northern end of this belt - slate, quartzite and hornfels - probably represent a separate formation underlying the Tidbinbilla Quartzite.

Graptolites were found in metamorphics along the road between Pierce's Creek and Vanity's Crossing on the Cotter River, and these indicated an Upper Ordovician Age.

Another narrow belt of metamorphics, and several isolated outcrops, form prominent ridges between the valley of Paddy's River and the Murrumbidgee. These metamorphics include quartzite, indurated shale and some limestone. The Tidbinbilla Quartzite may be represented, but most of these metamorphics probably belong to older formations.

Lead-zinc mineralisation is associated with these metamorphics and particularly with limestone at two localities in the valley of Paddy's River.

B. Igneous Rocks.

(1) Granite.

The most extensive outcrops of granite lie west of the Murrumbidgee in the valley of Paddy's River, and are part of the Tharwa batholith. Small outcrops of granite have been mapped on Condor Creek, and in the Upper Cotter Valley (Cowflat Granite and Bendora Granite). All of these granitic intrusives are probably genetically related, but no detailed petrological work has been carried out to confirm this. The granites intrude all of the metamorphic formations, and the porphyry, and are probably referrable to the Kanimbda Intrusive Epoch in late Devonian time.

(2) Porphyries.

On the geological map the term "porphyry" has been used as a field name for a complex of hypabyssal, volcanic and pyroclastic rocks. These rocks outcrop over a wide area west and south-west of Canberra. They include quartz porphyries, dacites porphyrites, a variety of tuff and probably some interbedded flows. They are associated with fossiliferous Upper Silurian sediments in the Canberra area and an Upper Silurian tribolite has been found in tuffaceous shales on the Brindabella road, approximately one mile west of Uriarra.

The distinction between tuff and porphyry in some places is particularly difficult, and sub-division of these rocks will depend largely on detailed petrological work.

(3) Volcanic Rocks.

Volcanic rocks were found over a considerable area in the north-western corner of the Territory in the vicinity of Mount Coree. These volcanics have not yet been studied in thin section, but they include intermediate or even alkaline types. Their relationship to the porphyries and associated pyroclastics has not been definitely established.

IV. Recommendations for Future Work.

The results of this regional work suggest a number of problems which should be investigated as opportunity offers. The most important problems for future workers are as follows:-

1. The metamorphics lying between the Cotter and the Murrumbidgee Rivers should be investigated more critically in an attempt to sub-divide these rocks into Tidbinbilla and other formations. This may be done by collecting detail on structure, lithology and palaeontology in the field and by closer study of the air photographs.

2. The northern extension of the Cotter Fault should be traced. Air photographs suggest that the Fault may be traced northwards in the porphyry, but field traverses will be required to confirm this. These traverses will also determine the relationship between the Tidbinbilla Quartzite and the Franklin Formation upstream from the porphyry.

3. The volcanics in the vicinity of Mount Coree should be studied in thin section and their relationship to the Silurian porphyries and pyroclastics definitely determined in the field. If these rocks are alkaline lavas, they may represent the Middle Devonian volcanics found in the Yass District.

4. Air photographs suggest that the contact of the Franklin Formation with the porphyry at Condor Creek may be a faulted one. Also, the Upper Silurian shales on the Uriarra- Brindabella road andthe conglomerate found on Condor Creek near the porphyry contact need further investigation particularly as regards their relationship to the Franklin Formation.

5. The supposed fault along the Murrumbidgee Valley should be further investigated. Air photographs should indicate those areas where field evidence might prove or disprove the existence of the fault.

17th June, 1948.
CANBERRA, A.C.T.

(L.C. Noakes)
Geologist.

GEOLOGICAL PLAN

OF

N.W. PORTION OF A.C.T.

SCALE.

Chains. 0 40 80 120 160.

Miles. 0 ½ 1 1½ 2

40 Chains = 1 Inch.

Var. 9° E

M.M.

LEGEND.

- Granite.
- Porphyry.
- Volcanic Types.
- Franklin Formation.
- Tidbinbilla & other Metamorphic Formations
- Limestone & Mineralised Area.
- 45° Dip-Strike Symbol.
- Territorial Boundary.
- Motor Roads.

Swamp Creek

Two Sticks Trig.

Orroral Creek

MOLONGLO RIVER

Coree Trig.

Horizon B

Coree Creek

Cooper Creek

Strom Trig.

To Canberra.

MURRUMBIDGEE

Blundell Trig.

Horizon A

Sugarloaf

Lees Creek

Hardy Trig.

Hardy Creek

RIVER

Tidbinbilla Quartzite

Murray's Hill

Black Hill (?)

Black Springs

Pierce's Creek

Bullshead Trig.

COTTER

Tidbinbilla Trig. 4

RIVER

PADDYS RIVER

TIDBINBILLA Creek

Gibraltar Creek

THARWA

ACTG 2-6