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Record 1973/50

TABLES OF ISOTOPIC AGES FROM THE GEORGETOWN INLIER, NORTH QUEENSLAND

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INTRODUCTION

The purpose of this Record is to present previously unpublished data in a form suitable for quotation in an article on the Regional Geology of the Georgetown, Yamba, and Coen Inliers. The article is to appear in the Metalliferous Volume of the Economic Geology of Australia and P.N.G. being prepared by the Australasian Institute of Mining and Metallurgy.

In essence Table 1 presents Rb-Sr mineral ages recently determined by the author; these are compared with K-Ar ages previously determined on the same samples, and reported in Richards et al. (1966). Table 2 contains whole-rock Rb-Sr data from three units within the Georgetown Inlier. The data for the Newcastle Range Volcanics are the work of the author. Those for the Croydon Volcanics and the Esmeralda Granite were determined by A.W. Webb of the Australian Mineral Development Laboratories (report An5188/71). The value $1.39 \times 10^{-11}\ y^{-1}$ has been used for the ^{87}Rb decay constant in all age calculations.

EXPLANATION OF TABLES

The overall results indicate an extensive resetting of both K-Ar and Rb-Sr mineral ages. This effect, combined with a present dearth of whole-rock isotopic information, makes it difficult to decipher an unambiguous Precambrian history for much of the inlier. However, the concordant biotite ages (K-Ar = 1200; Rb-Sr = 1270) for the granite at Forest Home (G.A. 441), and the Precambrian mica ages for samples 410, 412, and 414 nearer the centre of the inlier, which can probably be interpreted only as minimum ages, do suggest more than one intrusive event. The indicated muscovite Rb-Sr age for the pegmatite in the Einasleigh Metamorphics should be treated as highly tentative in the absence of corroborative whole-rock data. It is proposed to collect further samples from this unit during the 1973 field season.

There appears to be an increasing incidence of Siluro-Devonian mica ages towards the eastern margin of the inlier, a trend probably produced during the orogenic phase of the adjacent Tasman Geosyncline. The effects of this event are so pronounced in places that it is at present, impossible to say on the isotopic evidence whether, for example, the mass of Forsayth Granite at Dargalong, or the gross metamorphic fabric of the Dargalong Metamorphics, are of Precambrian or middle Palaeozoic age.

Conformable muscovite and total-rock Rb-Sr ages for the Esmeralda Granite, and the Rb-Sr total rock age for the associated Croydon Volcanics on the western boundary of the inlier, now clearly indicate that these units are not the same age as the igneous rocks on

the eastern margin of the inlier as had been postulated by Branch et al. (1960), White (1962), and Branch (1966). The Newcastle Range Volcanics cropping out in the centre of the inlier area, however, of closely similar age to these Upper Palaeozoic igneous rocks, the ages of which were reported by Richards et al. (1966) and Black & Richards (1972 a, b).

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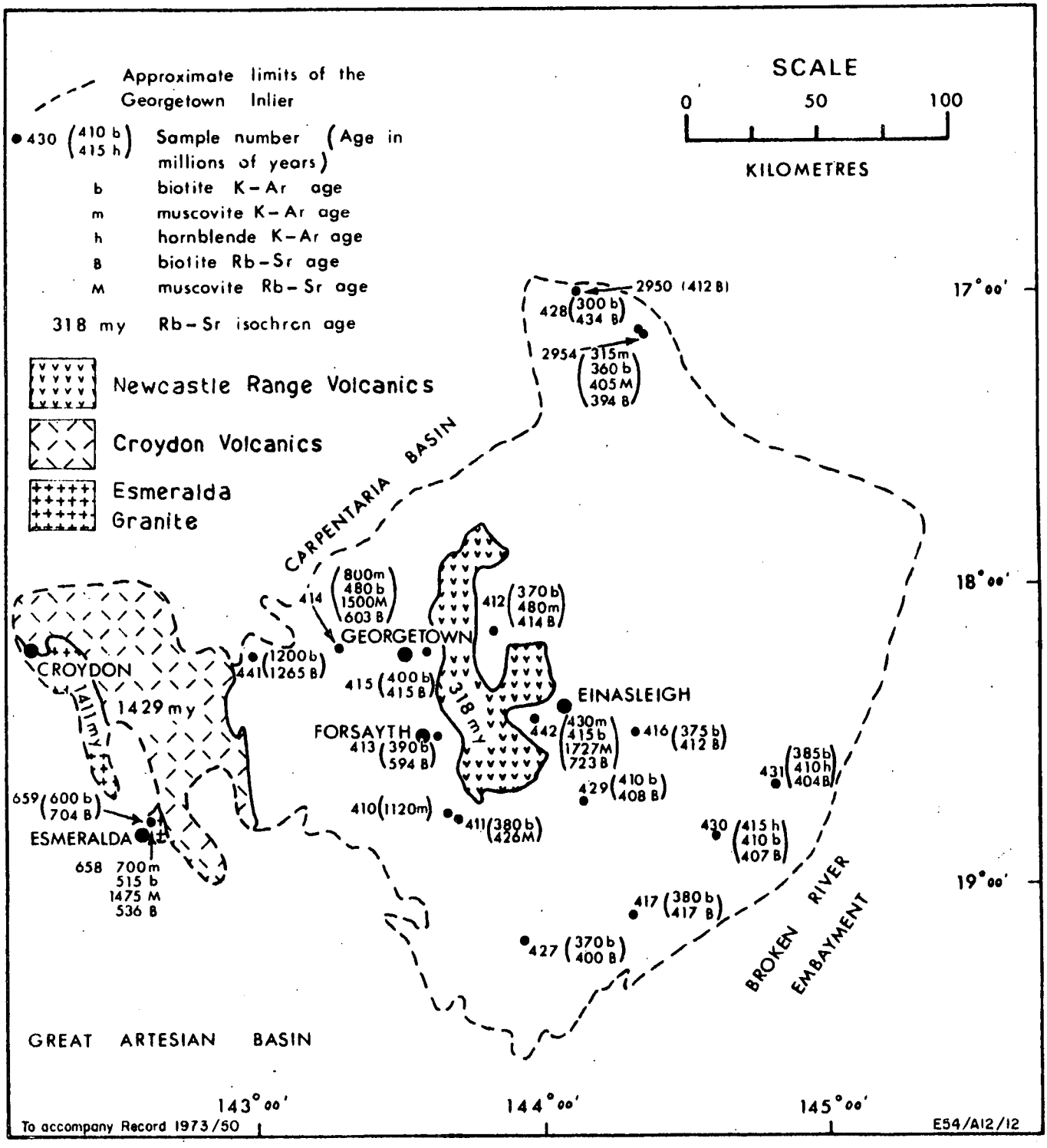

Isotopic Ages for the Georgetown Inlier

TABLE 1: MINERAL AGES FOR THE GEORGETOWN INLIER

B.M.R. Sample Number	A.N.U. Sample Number	Rock Classification	Location	Mineral	Rb	Sr	$^{87}Sr/^{86}Sr$	$^{87}Rb/^{86}Sr$	Rb-Sr Age m.y.+	K-Ar Age m.y.++
68590416	410	Robin Hood Granite	5 km NW of Robin Hood Homestead	muscovite						1120
68590018	411	Robin Hood Granite	2 km NW of Robin Hood Homestead	biotite	448.3	20.95	1.0904	64.10	426	380
68590019	412	Forsayth Granite	16 km W of Eveleigh Homestead	biotite	526.5	11.531	1.5314	142.45	414	370
				muscovite	515.6	168.45	0.84547	8.955	1085	480
" 020	413	Forsayth Granite	8 km E of Forsayth	biotite	850.8	7.077	4.7191	483.3	594	390
" 021	414	Forsayth Granite	56 km W of Georgetown	biotite	1426.7	8.551	7.4264	789.3	603	460
				muscovite	635.7	12.695	5.0527	206.0	1500	800
" 417	415	Forsayth Granite	8 km E of Georgetown	biotite	775.7	14.238	1.7082	172.70	415	400
" 103	416	Forsayth Granite	32 km ESE of Einasleigh	biotite	560.0	18.325	1.2436	92.86	412	375
" 427	417	Dumbano Granite	8 km W of Lyndhurst Homestead	biotite	711.0	12.409	1.7725	186.67	417	380
" 428	427	Dumbano Granite	11 km SW of Glenmore Homestead	biotite	685.9	10.240	1.9171	216.3	400	370
" 429	428	Forsayth Granite	Near Dargalong, 11 km SW of Chillagoe	biotite	400.5	16.876	1.1689	71.61	434*	300**
" 425	2954	Forsayth Granite	Near sample 428	biotite		34	0.8921	29.73	394*	360**
				muscovite			0.8464	20.86	405*	315**
				plagioclase			0.7291	0.1823		
" 100	429	Forsayth Granite	35 km SSE of Einasleigh	biotite	58.4	54.45	0.8267	20.52	408	410
" 430	430	Dido Granodiorite	11 km ESE of Lynd Homestead	biotite	304.5	28.36	0.8941	31.57	407	410
				hornblende						415
" 431	431	Dido Granodiorite	8 km S of Wyandotte Homestead	biotite	282.1	27.90	0.8823	29.69	404	385
				hornblende						410
" 016	441	?Forsayth Granite	near Forest Home Station	biotite	1284.1	17.530	6.6382	334.2	1265	1200
" 022	442	Pegmatite in Einasleigh metamorphics	13 km WSW of Einasleigh	biotite	541.0	10.359	2.50123	177.256	723	415
				muscovite	344.1	46.52	1.2566	22.50	1727	430
" 432	658	Esmeralda Granite	6 km N of Esmeralda Homestead	biotite	21.35	11.970	6.9226	828.3	536 ¥	515
				muscovite	1156.4	19.072	6.3622	271.9	1475 ¥	700
" 433	659	Esmeralda Granite	8 km N of Esmeralda Homestead	biotite	956.3	8.298	5.5576	490.6	704 ¥	600
" 434	2950	Dargalong Metamorphics	9 km E of Cardross	biotite	428.1	3.562	3.1870	431.2	412	

\+ Assuming an initial ration of 0./1. ++ After Richards et al., 1966.

* Using initial ratio of 0.729 as derived from the plagioclase analyses.

** K-Ar analyses by courtesy of J. Lovering, Department of Geophysics and Geochemistry, A.N.U.

¥ Using an initial ration of 0.73 as obtained from the whole rock data.

TABLE 2: TOTAL ROCK ISOTOPIC DATA FOR THE GEORGETOWN INLIER

Sample Number	Rock Type	Location	Rb	Sr	$^{87}Sr/^{86}Sr$	$^{87}Rb/^{86}Sr$
NEWCASTLE RANGE VOLCANICS						
70571200	porphyritic, rhyolitic dyke	13½ km E of Georgetown	230.3	25.58	0.8311	26.31
70571203	rhyodacite welded tuff	17 km E of Georgetown	137.14	107.87	0.7315	3.680
70571205	porphyritic rhyodacite welded tuff	17½ km E of Georgetown	148.99	74.11	0.7399	5.823
70571208	porphyritic rhyolite	20 km E of Georgetown	257.5	18.057	0.9005	41.95
70571214	banded rhyolite	25 km E of Georgetown	51.40	62.60	0.7252	2.375
70571215	porphyritic rhyodacite	25 km E of Georgetown	173.64	61.97	0.7497	8.122
70571220	porphyritic rhyodacite welded tuff	6½ km SW of Eveleigh Homestead	134.53	149.53	0.7283	2.603
70571221	porphyritic rhyodacite welded tuff	6½ km SW of Eveleigh Homestead	150.67	123.73	0.7319	3.524
70571228	rhyodacite	near Mount Fisher Gold mine	116.90	236.5	0.7206	1.4289
653*	rhyodacite	13 km N of Einasleigh	156	39.4	0.7667	11.470
653Kf	K-feldspar concentrate	as above	338	50.0	0.8048	19.670

Age of Newcastle Range Volcanics = 318 ± 5 m.y.; initial ratio = 0.7152 ± .0011.

* Reported in Richards et al., 1966.

CROYDON VOLCANICS (Analyses performed by the Australian Mineral Development Laboratories; Report An 5188/71).

70571044	porphyritic rhyolite	14½ km NNE of Croydon			1.7804	89.75
" 047	porphyritic rhyolite	13 km NNE of Croydon			1.0586	15.023
" 050	porphyritic rhyodacite	6½ km N of Croydon			0.9471	10.875
" 056	recrystallized porphyritic rhyodacite	16 km N of Esmeralda Homestead			0.8951	8.292
" 068	porphyritic rhyodacite	Stanhills Battery			1.1142	19.005
" 072	recrystallized porphyritic rhyodacite	13½ km NNE of Stanhills Battery			1.1135	19.514
" 079	porphyritic rhyodacite	9½ km NE of Alenvale Homestead			1.0825	19.008
" 084	porphyritic rhyodacite	6½ km WSW of Inorunie Homestead			0.9876	15.041
" 090	rhyodacite	4 km SW of Langlo Homestead			0.8507	6.061
1379*	acid welded tuff	3 km N of Croydon	204	99.3	0.847	6.003
1380*	?porphyritic rhyodacite welded tuff	Stanhills area, 20 miles SE of Croydon	301	69.0	0.988	12.58

Age of Croydon Volcanics = 1429 ± 75 m.y., initial ratio = 0.7287 ± .0095. after deletion of samples 1044, 1047, 1079, and 1084.

* Reported in Richards et al., 1966.

ESMERALDA GRANITE (Analyses performed by the Australian Mineral Development Laboratories; Report AN 5188/71)

70571052	biotite-muscovite granite	4 km N of Esmeralda Homestead		1.4155	35.01
" 054	biotite adamellite	4 km N of Esmeralda Homestead		0.8111	4.200
" 064	biotite granite	7 km SSW of Stanhills Battery		1.1590	18.028
" 065	biotite-muscovite granite	5 km SSW of Stanhills Battery		1.9605	65.96
" 067	biotite granite	3 km SW of Stanhills Battery		2.4348	96.30
" 073	biotite-muscovite adamellite	Lily Hut		0.9066	8.625
" 074	biotite granite	6 km NNE of Lily Hut		1.1629	19.032
" 075	biotite granite	near Mount Cassiterite		0.9447	10.784
" 086	biotite adamellite	5½ km SW of Langlo Homestead		0.8497	6.148
" 087	biotite adamellite	5½ km SW of Langlo Homestead		0.8739	6.896

Age of Esmeralda Granite = 1411 ± 99 m.y.; initial ratio = 0.7314 ± 0116 after deletion of samples 1064, 1065, 1067 and 1074.