

168751: biotite monzogranite, Round Yard Bore

Location and sampling

ROBINSON RANGE (SG 50-7)

MGA Zone 50, 575250E 7206620N

Sampled on 5 October 1999

The sample was taken from a low elongate rise of granite tors and weathered pavements, 900 m west of a northerly trending fence and 2.8 km southeast of Round Yard Bore.

Tectonic unit/relations

This sample is from a c. 20 × 50 m xenolith of fine- to medium-grained biotite monzogranite, which occurs as screens and pendants within the main phase of the Discretion Granite (Sheppard and Swager, 1999).

Petrographic description

The principal minerals present in this sample are plagioclase (35 vol.%), quartz (30 vol.%), microcline (25–30 vol.%), biotite (3 vol.%), magnetite (1–2 vol.%), ilmenite (1–2 vol.%), and titanite (<1 vol.%), with accessory apatite (trace), muscovite (trace), epidote (trace), and minute radioactive grains (trace). This is a pale- to mid-grey, massive, homogeneous, fine-grained leucocratic monzogranite with minor biotite, muscovite, epidote, magnetite, and ilmenite. It consists of homogeneous, hypidiomorphic aggregates of abundant plagioclase and microcline, up to 2.5 mm in grain size, and finer quartz. The plagioclase is crowded with decussate to poikilitic flakes of muscovite up to 0.5 mm in size, but the microcline is largely fresh. Quartz occurs as irregularly lobate, largely interstitial grains up to 2 mm long, but is mostly less than 1 mm long. There are two types of accessory opaque oxides, up to 0.5 mm in grain size: one type is fresh and probably magnetite; the other is probably ilmenite, which has been partly to completely replaced by fine-grained secondary titanite. Minor biotite occurs as flakes from 0.05 to 0.8 mm long, locally with muscovite and/or epidote. Sparse, fine, granular titanite accompanies the biotite in some areas. Apatite is rare. Some of the biotite incorporates pleochroic haloes but the included grains cannot be identified optically.

Zircon morphology

The zircons isolated from this sample are colourless, yellow-brown, and dark brown, generally between 10 × 25 µm and 35 × 200 µm in size, and are elongate, subrounded or irregular in shape. Most are dark and metamict. Fluid and mineral inclusions are common.

Analytical details

The sample was analysed on 22 June 2000. The counter deadtime was 32 ns. Nine analyses of the CZ3 standard obtained during the analysis session indicated a Pb*/U calibration error of 1.27 (1σ%). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses, with the exception of analysis 5.1, for which isotopic compositions determined using the method of Cumming and Richards (1975) were assumed.

Table 6. Ion microprobe analytical results for zircons from sample 168751: biotite monzogranite, Round Yard Bore

<i>Grain .spot</i>	<i>U (ppm)</i>	<i>Th (ppm)</i>	<i>Pb (ppm)</i>	<i>f206%</i>	<i>²⁰⁷Pb/²⁰⁶Pb</i>	<i>±1σ</i>	<i>²⁰⁸Pb/²⁰⁶Pb</i>	<i>±1σ</i>	<i>²⁰⁶Pb/²³⁸U</i>	<i>±1σ</i>	<i>²⁰⁷Pb/²³⁵U</i>	<i>±1σ</i>	<i>% concordance</i>	<i>²⁰⁷Pb/²⁰⁶Pb age</i>	<i>±1σ</i>
1.1	182	158	60	0.208	0.10117	0.00099	0.25139	0.00227	0.2825	0.0037	3.941	0.069	97	1 646	18
2.1	75	261	38	0.591	0.09903	0.00209	1.01985	0.00795	0.2765	0.0039	3.775	0.101	98	1 606	39
3.1	195	196	67	0.166	0.10169	0.00090	0.29020	0.00217	0.2873	0.0038	4.028	0.068	98	1 655	16
4.1	231	114	71	0.154	0.10074	0.00086	0.13801	0.00169	0.2860	0.0038	3.972	0.066	99	1 638	16
5.1	834	1 246	326	0.401	0.10085	0.00046	0.44774	0.00135	0.2904	0.0037	4.038	0.057	100	1 640	9
6.1	1 345	138	378	0.044	0.10124	0.00028	0.02808	0.00028	0.2889	0.0037	4.032	0.054	99	1 647	5
7.1	96	328	50	0.352	0.10276	0.00156	0.97955	0.00637	0.2872	0.0040	4.069	0.089	97	1 674	28
8.1	177	127	55	0.110	0.10092	0.00100	0.21825	0.00220	0.2710	0.0036	3.771	0.066	94	1 641	18
9.1	235	315	86	0.143	0.10117	0.00082	0.39393	0.00226	0.2819	0.0037	3.933	0.064	97	1 646	15
10.1	97	98	34	0.159	0.10378	0.00132	0.30656	0.00323	0.2876	0.0040	4.115	0.082	96	1 693	23
11.1	271	295	95	0.091	0.10163	0.00069	0.30959	0.00173	0.2877	0.0038	4.032	0.062	99	1 654	13
12.1	169	224	62	0.107	0.10230	0.00089	0.37489	0.00244	0.2889	0.0039	4.075	0.069	98	1 666	16
13.1	114	190	45	0.157	0.10126	0.00120	0.47925	0.00361	0.2871	0.0039	4.008	0.077	99	1 647	22
14.1	214	235	75	0.144	0.10052	0.00079	0.31533	0.00201	0.2869	0.0038	3.977	0.064	100	1 634	15
15.1	1 379	925	446	0.028	0.10066	0.00027	0.19011	0.00054	0.2905	0.0037	4.032	0.054	100	1 636	5
16.1	196	270	72	0.277	0.09794	0.00095	0.38560	0.00256	0.2845	0.0038	3.841	0.067	102	1 585	18
17.1	144	162	49	0.268	0.10162	0.00127	0.31781	0.00312	0.2762	0.0037	3.869	0.075	95	1 654	23
18.1	133	209	51	0.098	0.10370	0.00122	0.45188	0.00343	0.2842	0.0038	4.063	0.077	95	1 691	22
19.1	397	140	134	0.092	0.10922	0.00056	0.09909	0.00090	0.3232	0.0042	4.867	0.071	101	1 786	9
20.1	327	354	114	0.260	0.10020	0.00071	0.31183	0.00177	0.2833	0.0037	3.914	0.061	99	1 628	13

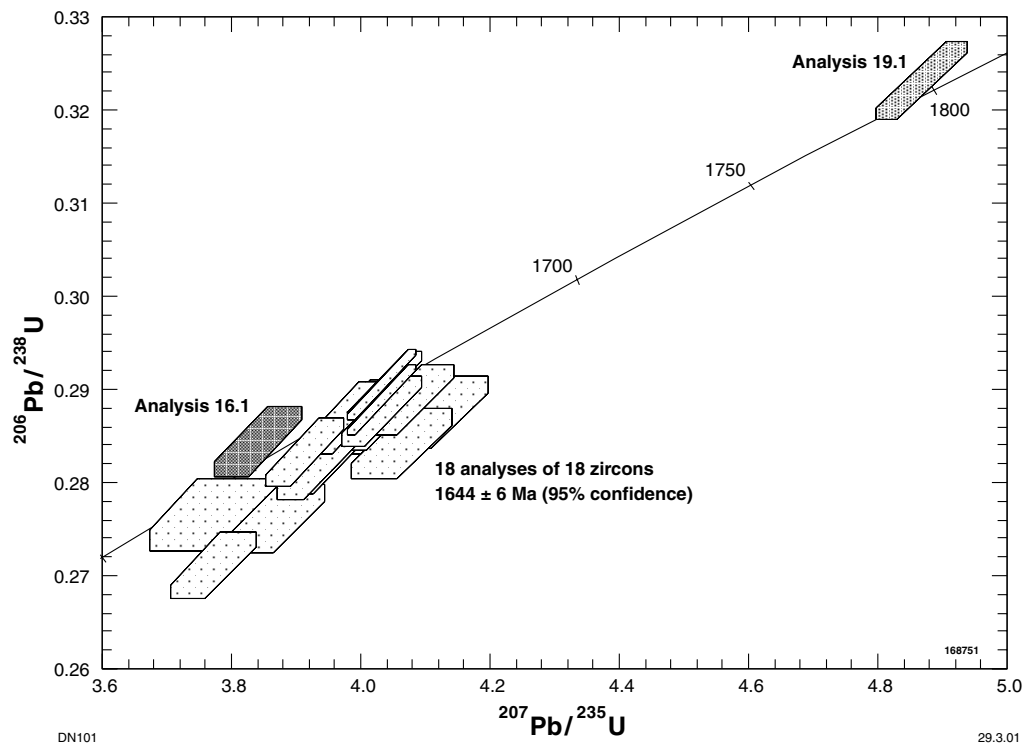


Figure 7. Concordia plot for sample 168751: biotite monzogranite, Round Yard Bore

Results

Twenty analyses were obtained from 20 zircons. Results are given in Table 6 and shown on a concordia plot in Figure 7.

Interpretation

Most analyses are concordant or slightly discordant, with the discordance pattern consistent with several episodes, including a single recent episode and possibly an ancient episode, of radiogenic-Pb redistribution. Eighteen concordant analyses of 18 zircons have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 1644 ± 6 Ma (chi-squared = 1.08). Concordant analysis 16.1 indicates a slightly lower $^{207}\text{Pb}/^{206}\text{Pb}$ ratio, whereas concordant analysis 19.1 indicates a significantly higher $^{207}\text{Pb}/^{206}\text{Pb}$ ratio than the main population.

The date of 1644 ± 6 Ma indicated by the weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ ratio of 18 concordant analyses interpreted as the time of igneous crystallization of the monzogranite. The slightly younger $^{207}\text{Pb}/^{206}\text{Pb}$ date indicated by analysis 16.1 may be due to the ancient loss of some accumulated radiogenic Pb from this analysis site. Analysis 19.1, which indicated a substantially older $^{207}\text{Pb}/^{206}\text{Pb}$ date, is interpreted to be of xenocryst zircon.

STRATIGRAPHIC REFERENCE:

SHEPPARD, S., and SWAGER, C. P., 1999, Geology of the Marquis 1:100 000 sheet: Western Australia Geological Survey, 1:100 000 Geological Series Explanatory Notes.

Recommended reference for this publication:

NELSON, D. R., 2001, 168751: biotite monzogranite, Round Yard Bore; in Compilation of geochronology data, 2000: Western Australia Geological Survey, Record 2001/2, p. 21–23.

OR

NELSON, D. R., 2001, 168751: biotite monzogranite, Round Yard Bore; Geochronology dataset 219; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

Data obtained: 22/06/2000; Data released: 13/09/2001