

# 124442: biotite–hornblende syenogranite, Turkey Nest Dam

## (Paperbark Supersuite, Western Zone, Lamboo Province, Halls Creek Orogen)

### Location and sampling

DIXON RANGE (SE 52-6), MOUNT REMARKABLE (4463)  
MGA Zone 52, 373964E 8101684N

Sampled on 12 August 1994

This sample was collected from outcrop on the northern side of a hill on Bow River Station, about 17.3 km northwest of 9 Mile Yard, 15.7 km northeast of Foal Creek Yard, and 7.5 km east-southeast of Turkey Nest Dam.

### Tectonic unit/relations

The unit sampled is a biotite–hornblende syenogranite (Fig. 1) of the Paperbark Supersuite, which is exposed throughout the Western Zone of the Lamboo Province over a distance of about 700 km, in both the east and west Kimberley region. The 1867–1849 Ma Paperbark Supersuite comprises granite, porphyritic microgranite, felsic volcanic rock, gabbro, and mafic–ultramafic intrusions, and intrudes the c. 1870 Ma Marboo Formation and is unconformably overlain by the 1835–1790 Ma Speewah and Kimberley Basins (Griffin et al., 2000). This locality was originally mapped as the 1827–1808 Ma Kevins Dam Monzogranite of the Kevins Dam Suite, Sally Downs Supersuite (Sheppard et al., 1996). However, geochronology reported below for the present sample suggests that its igneous crystallization age is significantly older and that the mapped unit is part of the Paperbark Supersuite. A metamonzogranite of the Paperbark Supersuite, collected about 52 km to the northeast, yielded an igneous crystallization age of  $1852 \pm 3$  Ma (GSWA 218313, Lu et al., 2020).

### Petrographic description

The sample is a medium- to coarse-grained, inequigranular biotite–hornblende syenogranite (Fig. 1), consisting of about 45–50% K-feldspar, 35–38% quartz, 12% plagioclase, 3% biotite, 2% hornblende, and accessory magnetite, allanite, and zircon. K-feldspar is very finely micropertthitic, anhedral to subhedral, and up to 10 mm in size. Quartz occurs as anhedral, moderately strained intergrown grains in aggregates to 8 mm in diameter, and as a few grains coarsely intergrown with K-feldspar. Plagioclase (andesine,  $An_{32-36}$ ) occurs as short tabular subhedral grains, up to 2 mm long, mostly altered to fine-grained epidote–sericite–chlorite. Green–brown biotite forms ragged, anhedral to subhedral grains, up to 2.5 mm in size, with minor chlorite alteration. Green hornblende is euhedral to subhedral, up to 1 mm long, with minor alteration to actinolite, chlorite, and iron oxide minerals.

Magnetite is subhedral to euhedral and up to 0.8 mm in size. Brown allanite is mainly euhedral, zoned, and up to 1 mm long. Apart from strained quartz, the sample is undeformed, and the secondary mineralogy is consistent with lower greenschist metamorphic conditions.

### Zircon morphology

Zircons isolated from this sample are pale brown to dark brown, and mainly euhedral. The crystals are up to 300  $\mu$ m long, equant to elongate, with aspect ratios up to 6:1. In cathodoluminescence (CL) images, concentric zoning is ubiquitous. A CL image of representative zircons is shown in Figure 2.

### Analytical details

This sample was analysed on 6–7 June 2019, using SHRIMP-B. Twelve analyses of the CZ3 standard obtained during the session indicated an external spot-to-spot (reproducibility) uncertainty of 0.64% ( $1\sigma$ ) and a  $^{238}\text{U}/^{206}\text{Pb}^*$  calibration uncertainty of 0.30% ( $1\sigma$ ). Isotopic mass fractionation of  $^{207}\text{Pb}/^{206}\text{Pb}$  ratios during the session was corrected by reference to the OGC1 standard; measured ratios were increased by 0.23%. Calibration uncertainties are included in the errors of  $^{238}\text{U}/^{206}\text{Pb}^*$  ratios and dates listed in Table 1. Common-Pb corrections were applied to all analyses using contemporaneous isotopic compositions determined according to the model of Stacey and Kramers (1975).

### Results

Twenty-two analyses were obtained from 22 zircons. Results are listed in Table 1, and shown in a concordia diagram (Fig. 3).

### Interpretation

The analyses are concordant to slightly discordant (Fig. 3), and form a single group, based on their  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ratios.

Group I comprises 22 analyses (Table 1), which yield a weighted mean  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  date of  $1854 \pm 5$  Ma (MSWD = 0.71).

The date of  $1854 \pm 5$  Ma for the 22 analyses in Group I is interpreted as the magmatic crystallization age of the syenogranite.



Figure 1. Hand specimen image for sample 124442: biotite-hornblende syenogranite, Turkey Nest Dam

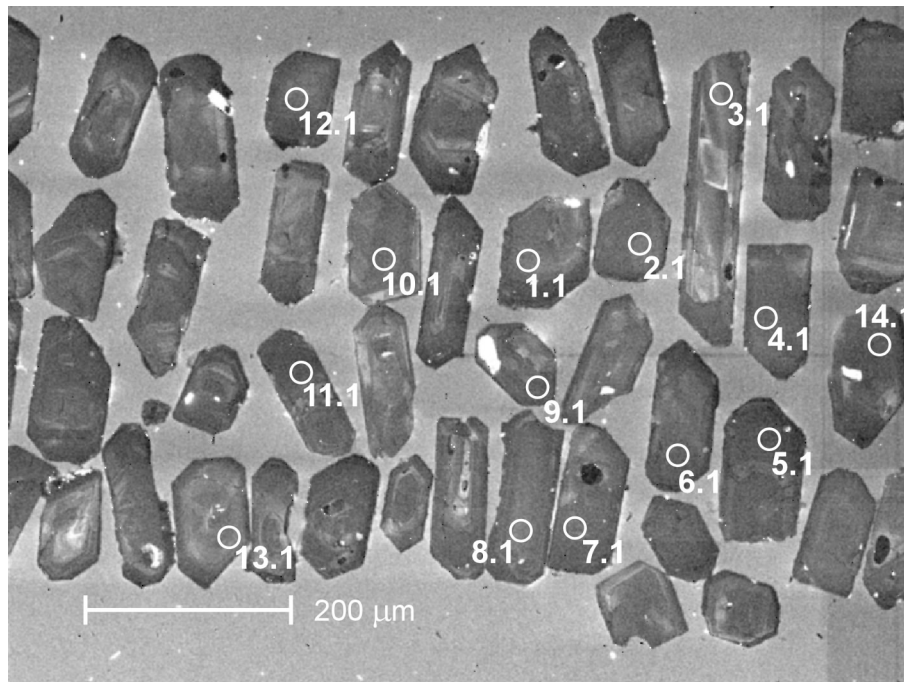
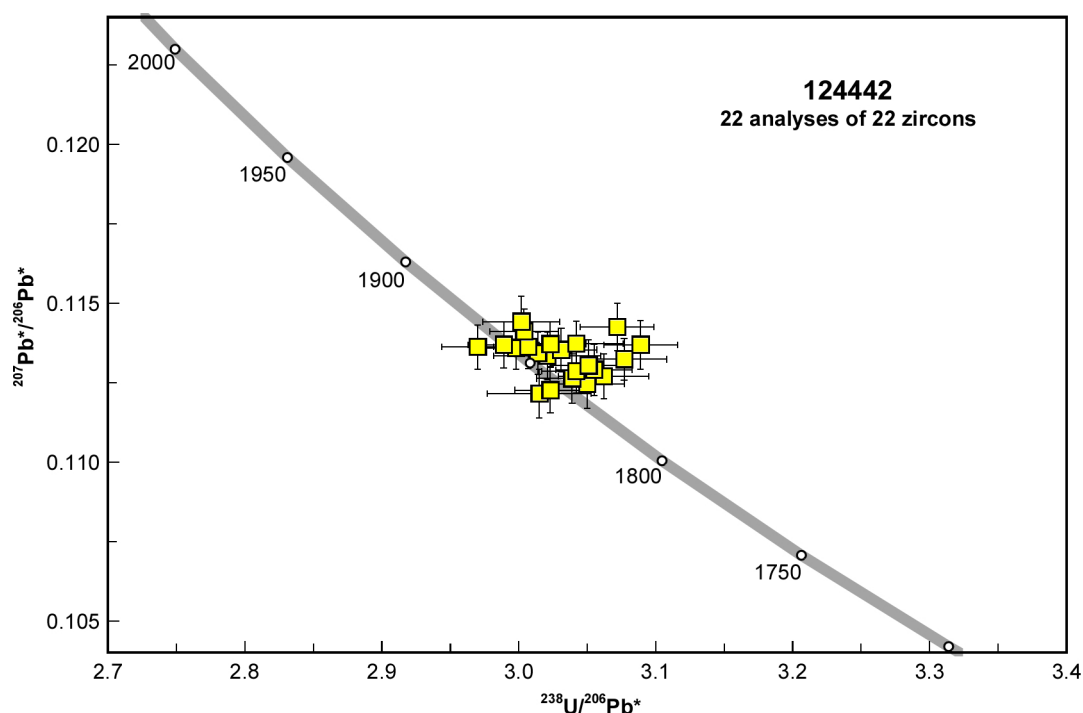


Figure 2. Cathodoluminescence image of representative zircons from sample 124442: biotite-hornblende syenogranite, Turkey Nest Dam. Numbered circles indicate the approximate locations of analysis sites

Table 1. Ion microprobe analytical results for zircons from sample 124442: biotite–hornblende syenogranite, Turkey Nest Dam

Group ID	Spot no.	Grain. spot	$^{238}\text{U}$ (ppm)	$^{232}\text{Th}$ (ppm)	$\frac{^{232}\text{Th}}{^{238}\text{U}}$	$f_{204}$ (%)	$^{238}\text{U}/^{206}\text{Pb} \pm 1\sigma$	$^{207}\text{Pb}/^{206}\text{Pb} \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^* \pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^* \pm 1\sigma$	$^{238}\text{U}/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	$^{207}\text{Pb}^*/^{206}\text{Pb}^*$ date (Ma) $\pm 1\sigma$	Disc. (%)						
I	15	15.1	252	102	0.41	0.009	3.015	0.038	0.11223	0.00076	3.015	0.038	0.11215	0.00076	1847	21	1835	12	-0.7
I	7	7.1	317	139	0.44	0.021	3.022	0.026	0.11245	0.00071	3.023	0.026	0.11226	0.00071	1842	14	1836	12	-0.3
I	13	13.1	289	130	0.45	0.064	3.048	0.027	0.11301	0.00073	3.050	0.027	0.11245	0.00076	1828	14	1839	12	0.6
I	16	16.1	323	140	0.43	0.102	3.036	0.026	0.11352	0.00073	3.039	0.026	0.11263	0.00077	1834	14	1842	12	0.5
I	18	18.1	353	152	0.43	0.052	3.060	0.033	0.11315	0.00070	3.062	0.033	0.11270	0.00071	1822	17	1843	11	1.2
I	11	11.1	453	193	0.43	0.052	3.040	0.025	0.11332	0.00066	3.042	0.025	0.11286	0.00068	1832	13	1846	11	0.7
I	21	21.1	236	106	0.45	0.053	3.054	0.028	0.11336	0.00079	3.055	0.028	0.11290	0.00081	1825	15	1847	13	1.1
I	2	2.1	231	113	0.49	0.071	3.048	0.028	0.11365	0.00078	3.051	0.028	0.11303	0.00081	1828	15	1849	13	1.1
I	5	5.1	481	216	0.45	0.029	3.076	0.031	0.11349	0.00066	3.077	0.031	0.11323	0.00066	1814	16	1852	11	2.0
I	19	19.1	296	165	0.56	-0.032	3.022	0.039	0.11306	0.00073	3.021	0.039	0.11334	0.00074	1844	21	1854	12	0.5
I	20	20.1	496	218	0.44	0.023	3.013	0.025	0.11362	0.00065	3.014	0.025	0.11342	0.00066	1847	13	1855	10	0.4
I	4	4.1	371	218	0.59	0.024	3.030	0.026	0.11374	0.00068	3.031	0.026	0.11353	0.00069	1838	14	1857	11	1.0
I	17	17.1	436	201	0.46	0.005	2.997	0.025	0.11364	0.00066	2.998	0.025	0.11359	0.00067	1856	14	1858	11	0.1
I	8	8.1	421	249	0.59	-0.037	3.009	0.025	0.11329	0.00067	3.007	0.025	0.11362	0.00068	1851	14	1858	11	0.4
I	12	12.1	342	198	0.58	-0.006	2.971	0.026	0.11357	0.00069	2.970	0.026	0.11362	0.00070	1871	15	1858	11	-0.7
I	1	1.1	276	129	0.47	0.041	3.088	0.027	0.11405	0.00074	3.089	0.027	0.11369	0.00076	1808	14	1859	12	2.8
I	9	9.1	370	174	0.47	0.015	2.989	0.026	0.11382	0.00072	2.989	0.026	0.11369	0.00073	1860	14	1859	12	-0.1
I	10	10.1	367	176	0.48	0.045	3.021	0.026	0.11411	0.00069	3.023	0.026	0.11371	0.00071	1843	14	1860	11	0.9
I	6	6.1	361	169	0.47	0.012	3.042	0.034	0.11384	0.00069	3.042	0.034	0.11373	0.00070	1832	18	1860	11	1.5
I	14	14.1	388	209	0.54	0.071	3.001	0.025	0.11473	0.00068	3.004	0.025	0.11411	0.00071	1853	14	1866	11	0.7
I	22	22.1	299	133	0.45	0.017	3.071	0.027	0.11440	0.00074	3.072	0.027	0.11425	0.00075	1817	14	1868	12	2.7
I	3	3.1	227	124	0.55	-0.038	3.003	0.028	0.11408	0.00078	3.002	0.028	0.11442	0.00080	1854	15	1871	13	0.9



**Figure 3. U–Pb analytical data for sample 124442: biotite–hornblende syenogranite, Turkey Nest Dam. Yellow squares indicate Group I (magmatic zircons)**

## References

- Griffin, TJ, Page, RW, Sheppard, S and Tyler, IM 2000, Tectonic implications of Palaeoproterozoic post-collisional, high-K felsic igneous rocks from the Kimberley region of northwestern Australia: *Precambrian Research*, v. 101, p. 1–23.
- Lu, Y, Wingate, MTD and Maidment, DW 2020, 218313: metamonzogranite, Bow River homestead; *Geochronology Record* 1650: Geological Survey of Western Australia, 4p.
- Sheppard, S, Tyler, IM and Hoatson, DM 1996, Mount Remarkable, WA Sheet 4463: Western Australia Geological Survey, 1:100 000 Geological Series.
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## Recommended reference for this publication

Lu, Y, Wingate, MTD, Maidment, DW and Sheppard, S 2020, 124442: biotite–hornblende syenogranite, Turkey Nest Dam; *Geochronology Record* 1695: Geological Survey of Western Australia, 4p.

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