

# 195870: metamonzogranite, Stalley Well

(Peak Hill Schist, Capricorn Orogen)

## Location and sampling

PEAK HILL (SG 50-8), BRYAH (2646)  
MGA Zone 50, 682508E 7160650N

Sampled on 25 May 2012

This sample was collected from low, weathered outcrops, about 8.4 km east of Mount Pleasant mine, 5.7 km northwest of Wilgeena mine, and 3.8 km south of Stalley Well.

## Tectonic unit/relations

The unit sampled is a strongly porphyritic metamonzogranite (Fig. 1) that forms the northern half of the Peak Hill Schist (Pirajno and Occhipinti, 1998). The Peak Hill Schist occurs at the southwestern end of the Archean Marymia Inlier and consists of mylonitized and metamorphosed rocks derived from quartz-rich and/or quartzofeldspathic precursors (Pirajno and Occhipinti, 1998). At this locality, the rock is a strongly sheared and altered quartz–feldspar–muscovite rock. A metaconglomerate of the Peak Hill Schist, sampled 10.0 km to the west (GSWA 195866, Wingate et al., 2014), yielded detrital zircon age components at c. 2737, 2670, and 2623 Ma, and a maximum age of deposition of  $2170 \pm 18$  Ma ( $1\sigma$ ). An augen gneiss of the Marymia Inlier, sampled 6.0 km to the northeast of the present sample site, yielded a magmatic crystallization age of  $2672 \pm 3$  Ma (GSWA 118957, Nelson, 1997).

## Petrographic description

The sample examined in thin section is very coarse grained and consists of about 90% quartz, 5% plagioclase, and 5% muscovite. Quartz is coarse-grained (up to 15 mm across) and occurs as interlocking aggregates and mosaics. Plagioclase (andesine,  $An_{40}$ ) is up to 1 mm across, partly sericite-altered, and forms inclusions in quartz. Muscovite occurs as unaltered flakes 0.5 – 0.7 mm across.

## Zircon morphology

Zircons isolated from this sample are colourless to dark brown and subhedral to euhedral. The crystals are up to 300  $\mu$ m long, and equant to elongate, with aspect ratios up to 5:1. In cathodoluminescence (CL) images, most zircons exhibit concentric zoning. A CL image of representative zircons is shown in Figure 2.

## Analytical details

This sample was analysed on 27–28 June 2013, using SHRIMP-A. Fourteen analyses of the BR266 standard obtained during the session indicated an external spot-to-spot (reproducibility) uncertainty of 1.08% ( $1\sigma$ ) and a  $^{238}\text{U}/^{206}\text{Pb}^*$  calibration uncertainty of 0.31% ( $1\sigma$ ). 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

Fifteen analyses were obtained from 15 zircons. Results are listed in Table 1, and shown in a concordia diagram (Fig. 3).

## Interpretation

The analyses are concordant to strongly discordant (Fig. 3). Five analyses are >10% discordant. The dates obtained from these five analyses (Group D; Table 1) are unreliable, and are considered not to be geologically significant. The remaining 10 analyses form a single group, based on their  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  ratios.

Group I comprises 10 analyses (Table 1), which yield a weighted mean  $^{207}\text{Pb}^*/^{206}\text{Pb}^*$  age of  $2663 \pm 3$  Ma (MSWD = 0.92).



Figure 1. Outcrop image of sample 195870: metamonzogranite, Stalley Well.

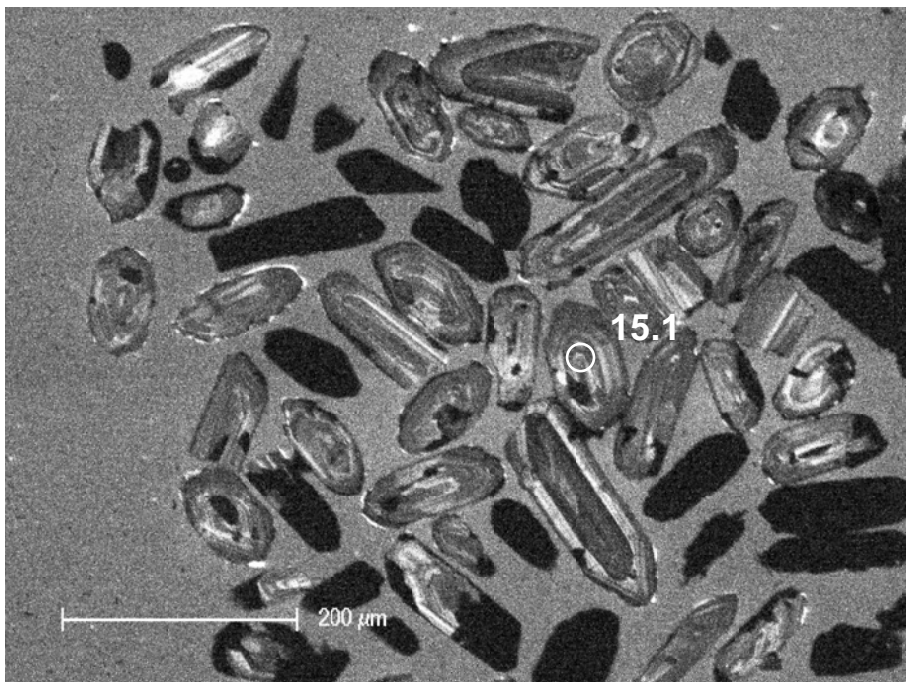
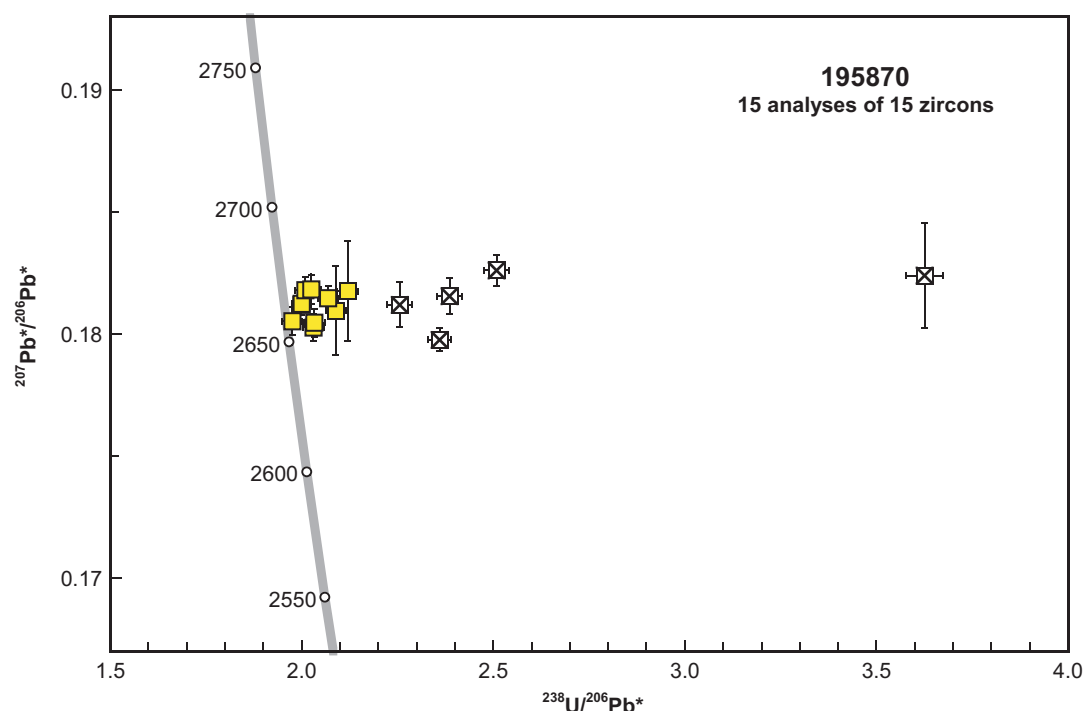


Figure 2. Cathodoluminescence image of representative zircons from sample 195870: metamonzogranite, Stalley Well. Numbered circles indicate the approximate locations of analysis sites.

Table 1. Ion microprobe analytical results for zircons from sample 195870: metamonzogranite, Stalley Well

Group ID	Spot no.	Grain. spot	<sup>238</sup> U (ppm)	<sup>232</sup> Th (ppm)	<sup>232</sup> Th/ <sup>238</sup> U	f <sub>204</sub> (%)	<sup>238</sup> U/ <sup>206</sup> Pb ± 1σ	<sup>207</sup> Pb/ <sup>206</sup> Pb ± 1σ	<sup>238</sup> U/ <sup>206</sup> Pb* ± 1σ	<sup>207</sup> Pb*/ <sup>206</sup> Pb* ± 1σ	<sup>238</sup> U/ <sup>206</sup> Pb* date (Ma) ± 1σ	<sup>207</sup> Pb*/ <sup>206</sup> Pb* date (Ma) ± 1σ	Disc. (%)
I	11	870-11.1	183	140	0.79	0.036	2.030 0.027	0.18059 0.00055	2.031 0.027	0.18027 0.00056	2581 28	2655 5	2.8
I	10	870-10.1	202	198	1.01	0.058	2.032 0.027	0.18099 0.00055	2.033 0.027	0.18047 0.00057	2579 28	2657 5	2.9
I	13	870-13.1	201	164	0.84	0.069	1.975 0.026	0.18115 0.00056	1.976 0.026	0.18053 0.00058	2640 29	2658 5	0.7
I	3	870-3.1	289	231	0.82	0.105	2.087 0.026	0.18190 0.00182	2.089 0.026	0.18096 0.00183	2521 26	2662 17	5.3
I	2	870-2.1	344	391	1.18	0.040	1.998 0.025	0.18157 0.00042	1.999 0.025	0.18121 0.00043	2615 27	2664 4	1.9
I	12	870-12.1	515	181	0.36	0.020	2.000 0.024	0.18143 0.00036	2.000 0.024	0.18125 0.00036	2614 26	2664 3	1.9
I	7	870-7.1	281	282	1.04	0.051	2.068 0.026	0.18193 0.00046	2.069 0.026	0.18147 0.00048	2541 27	2666 4	4.7
I	15	870-15.1	215	241	1.16	0.035	2.119 0.027	0.18207 0.00205	2.120 0.028	0.18176 0.00205	2491 27	2669 19	6.7
I	4	870-4.1	198	132	0.69	0.049	2.008 0.026	0.18224 0.00054	2.009 0.026	0.18180 0.00055	2604 28	2669 5	2.4
I	5	870-5.1	197	171	0.90	0.119	2.023 0.027	0.18289 0.00057	2.025 0.027	0.18183 0.00061	2587 28	2670 6	3.1
D	8	870-8.1	286	372	1.34	0.051	2.358 0.029	0.18023 0.00046	2.360 0.029	0.17977 0.00048	2278 24	2651 4	14.1
D	14	870-14.1	94	56	0.62	0.132	2.253 0.033	0.18238 0.00085	2.256 0.033	0.18120 0.00092	2365 30	2664 8	11.2
D	1	870-1.1	168	161	0.99	0.071	2.384 0.032	0.18218 0.00071	2.386 0.032	0.18155 0.00074	2257 26	2667 7	15.4
D	6	870-6.1	188	247	1.35	0.345	3.614 0.047	0.18549 0.00067	3.626 0.048	0.18240 0.00215	1570 19	2675 20	41.3
D	9	870-9.1	219	242	1.14	0.143	2.506 0.032	0.18388 0.00058	2.509 0.032	0.18261 0.00063	2162 24	2677 6	19.2



**Figure 3.** U–Pb analytical data for sample 195870: metamonzogranite, Stalley Well. Yellow squares indicate Group I (magmatic zircons); crossed squares indicate Group D (discordance >10%).

The date of  $2663 \pm 3$  Ma for the 10 analyses in Group I is interpreted as the magmatic crystallization age of the monzogranite.

## References

- Nelson, DR 1997, 118957: coarse-grained augen gneiss, Peak Hill ruins; Geochronology Record 451: Geological Survey of Western Australia, 4p.
- Pirajno, F and Occhipinti, SA 1998, Geology of the Bryah 1:100 000 sheet: Geological Survey of Western Australia, 1:100 000 Geological Series Explanatory Notes, 41p.
- Stacey, JS and Kramers, JD 1975, Approximation of terrestrial lead isotope evolution by a two-stage model: Earth and Planetary Science Letters, v. 26, p. 207–221.
- Wingate, MTD, Kirkland, CL and Johnson, SP 2014, 195866: metaconglomerate, Peak Hill mine; Geochronology Record 1153: Geological Survey of Western Australia, 6p.

## Recommended reference for this publication

Wingate, MTD, Kirkland, CL and Johnson, SP 2014, 195870: metamonzogranite, Stalley Well; Geochronology Record 1154: Geological Survey of Western Australia, 4p.

Data obtained: 28 June 2013

Data released: 31 January 2014