GSWA 194865: Biotite-Hornblende metamonzogranite, hanging wall of the Tagon Shear Zone, footwall of the Daringdella Shear Zone, Nornalup Zone, Thomas Fishery, SANDY BIGHT

Person submitting samples: Raphael Quentin de Gromard
Affiliation: Geological Survey of Western Australia
Project Title: Evolution of crustal structures in an inverted orogen, the east Albany–Fraser Orogen, Western Australia
Sample Number(s) (including IGSN if one exists): 194865
Mineral separation required? Yes or No:
Date submitted:

GEOGRAPHIC AREA/ PROVINCE/ BASIN : southern Western Australia/east Albany–Fraser Orogen	
1:250k SHEET NAME: MALCOLM	**NUMBER:** SI51-7
1:100k SHEET NAME: SANDY BIGHT	**NUMBER:** 3530
LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)	
ZONE: 51	
EASTING: 520547	**NORTHING:** 6238627
LATITUDE: -33.99274	**LONGITUDE:** 123.22248

STRATIGRAPHIC UNIT FORMAL NAME *: Recherche Supersuite
STRATIGRAPHIC UNIT INFORMAL NAME:
LITHOLOGY: biotite-hornblende metamonzogranite

HOLE ID (if applicable):
PECT (if applicable):
H FROM (metres):
H TO (metres):

* Stratigraphic Unit names can be searched and checked within the Australian Stratigraphic Units Database via the following link: https://asud.ga.gov.au/

Dating Objective

What is the geological question $^{40}Ar/^{39}Ar$ analysis will address?

Evolution of crustal structures of the east AFO - Exhumation history of the Nornalup Zone and evolution of the Tagon and Daringdella Shear Zones.

What type of age(s) are expected? (e.g. magmatic crystallisation, metamorphism, fluid alteration/mineralisation, cooling, shearing etc):

Cooling

Mineral target(s) for dating:

Biotite + hornblende

Estimated $^{40}Ar/^{39}Ar$ age (e.g. Cenozoic, Mesozoic, Paleozoic, Proterozoic, Archean – provide estimated numerical age range if possible):

Younger than c. 1310 Ma if not reset during AFO Stage 2. Otherwise, younger than c. 1170 Ma if reset during AFO Stage 2.

Sample Information

Location description (e.g. a sample of x was collected from y, z km from abc town):

The sample was collected from a rocky shoreline at Thomas Fishery in Cape Arid National Park, WA, and about 2.2 km southeast of the top of Mount Arid.

Lithological characteristics (rock description):

The sample is a medium- to coarse-grained, porphyritic, biotite-hornblende metamonzogranite with strong foliation and tight to isoclinal folds that fold a fabric and granitic veins. Locally asymmetric with vergence to the north.

Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):
This sample was analysed by U-Pb zircon and yielded a magmatic crystallization age of 1324 ± 7 Ma (GSWA 194865).
Two samples from the Malcolm Metamorphics, collected 48 and 54 km northeast of GSWA 194865, yielded U-Pb monazite metamorphic ages of 1335 ± 11 and 1183 ± 7 Ma (194869) and 1313 ± 6 and 1178 ± 10 Ma (194867).

Thin section description (if available):
The sample consists of about 40% K-feldspar, 25–30% quartz, 20–25% plagioclase, 6% biotite, 4% hornblende, 1% myrmekite, and minor magnetite, titanite, probable allanite, apatite, and zircon. K-feldspar (microcline) is anhedral, up to 7 mm diameter, and finely microperthitic. Deformation bands and incipient flame perthite occur in some larger grains. Lobes of plagioclase rich myrmekite up to 1.5 mm diameter occur around some K-feldspar margins. Quartz forms anhedral, weakly undulose grains up to 2.5 mm in size, although mostly occurs in aggregates with interdigitating, irregular grain boundaries. Quartz contains fine fractures and possible incipient deformation lamellae, but is not subgrained or recrystallized. Plagioclase (andesine, An32) is anhedral, weakly twinned, and up to 1.5 mm in size. Brown biotite forms well-aligned subhedral laths up to 1.5 mm long, as well as in aggregates of subparallel grains, and defines a tectonic foliation. Green hornblende is subhedral, prismatic, up to 2.5 mm long, and at least partially aligned with the foliation. Magnetite forms pitted subhedral grains up to 0.6 mm in size. Brown, probable metamict allanite forms prisms up to 0.6 mm long associated with anhedral titanite. Apatite and zircon both occur as 0.1 mm subhedral grains, mostly associated with biotite and hornblende. Mild deformation formed the biotite-defined foliation, probably at low to moderate metamorphic grade.

Photograph(s) e.g. field site, hand-specimen, photomicrograph:

Figure 7. Field photograph of folded biotite-hornblende metamonzogranite, sample 194865

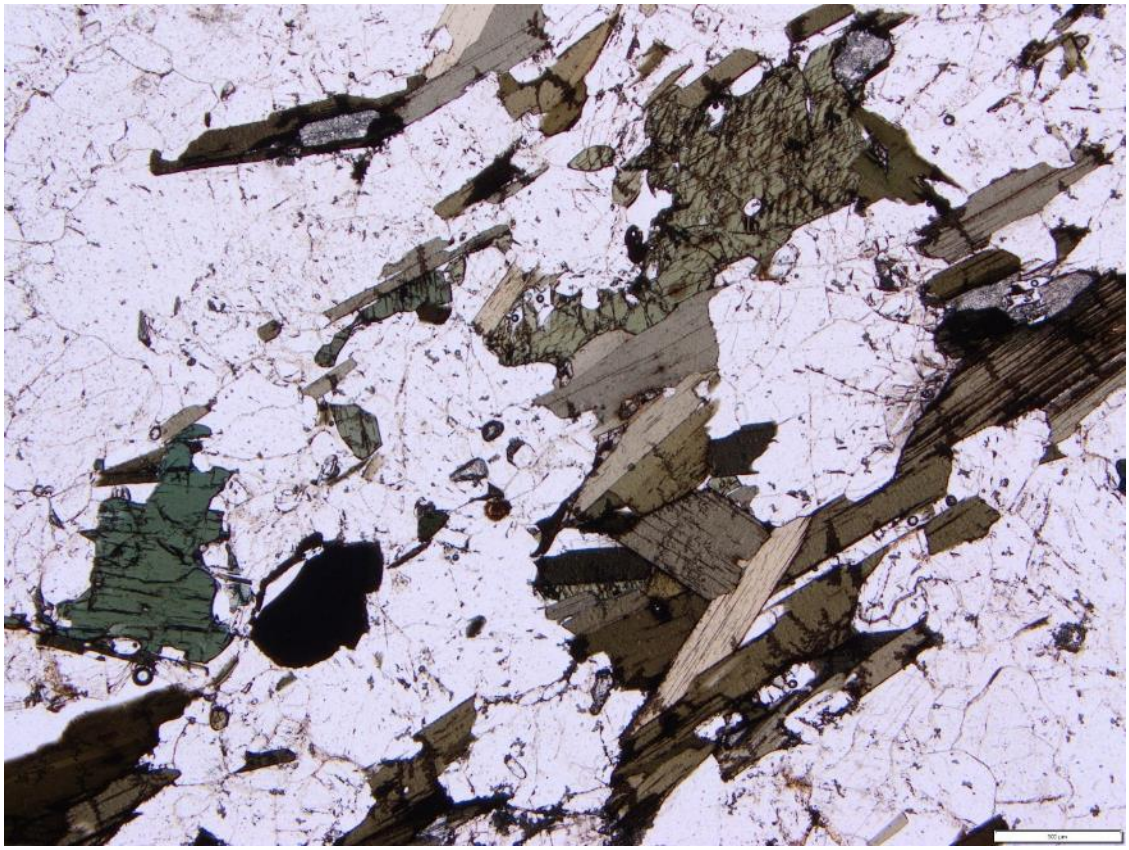

Figure 8. 194865_Bi-Hbl metamonzogranite, aligned bi laths and hbl define the foliation - PPL