

## Sample 20 of 20: 247932

<b>Person submitting samples:</b> Dave Kelsey
<b>Affiliation:</b> Geological Survey of Western Australia
<b>Project Title:</b> Tectonism and Exhumation of the Paterson Orogen and East Pilbara Craton margin
<b>Sample Number(s) (including IGSN if one exists):</b> 247932
<b>Mineral separation required? Yes or No:</b> Yes
<b>Date submitted:</b>

<b>GEOGRAPHIC AREA/ PROVINCE/ BASIN :</b> Paterson Orogen	
<b>1:250k SHEET NAME:</b> Anketell	<b>NUMBER:</b> SF51-02
<b>1:100k SHEET NAME:</b> Chauncy	<b>NUMBER:</b> 3356
<b>LOCATION METHOD: (GPS: WGS84 / AGD66 / AGD84 / GDA94)</b> GPS GDA94	
<b>ZONE:</b> 51	
<b>EASTING:</b> 414194	<b>NORTHING:</b> 7704423
<b>LATITUDE:</b> -20.7579	<b>LONGITUDE:</b> 122.1757

<b>STRATIGRAPHIC UNIT FORMAL NAME *:</b> either Malu or Puntapunta Formation. Unsure at this stage which, as it is under Canning Basin.
<b>STRATIGRAPHIC UNIT INFORMAL NAME:</b>
<b>LITHOLOGY:</b> Andalusite schist (metapelite)

<b>DRILLHOLE ID (if applicable):</b> 12AMD0015
<b>PROSPECT (if applicable):</b> Corker
<b>DEPTH FROM (metres):</b> 384.0 m
<b>DEPTH TO (metres):</b> 384.89 m

\* 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  $^{40}\text{Ar}/^{39}\text{Ar}$  analysis will address?**

Either: What is the age of the muscovite/foiation/metamorphism in this sample? OR What is the age of exhumation/cooling in this sample?

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

Either age of metamorphism to produce the muscovite OR cooling/exhumation.

**Mineral target(s) for dating:**

Muscovite

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

Mid- to Late-Neoproterozoic (probably c. 600–650 Ma).

### Sample Information

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

Located 39 km E of Nifty mine and 30 km NW of Telfer.

**Lithological characteristics (rock description):**

Andalusite-bearing muscovite + biotite schist. Contact metamorphism in the aureole of Crofton Suite granites. Andalusite, muscovite and biotite define a strong foliation.

**Relative age constraints (pertinent geological relationships with surrounding rock units and any previous geochronology):**

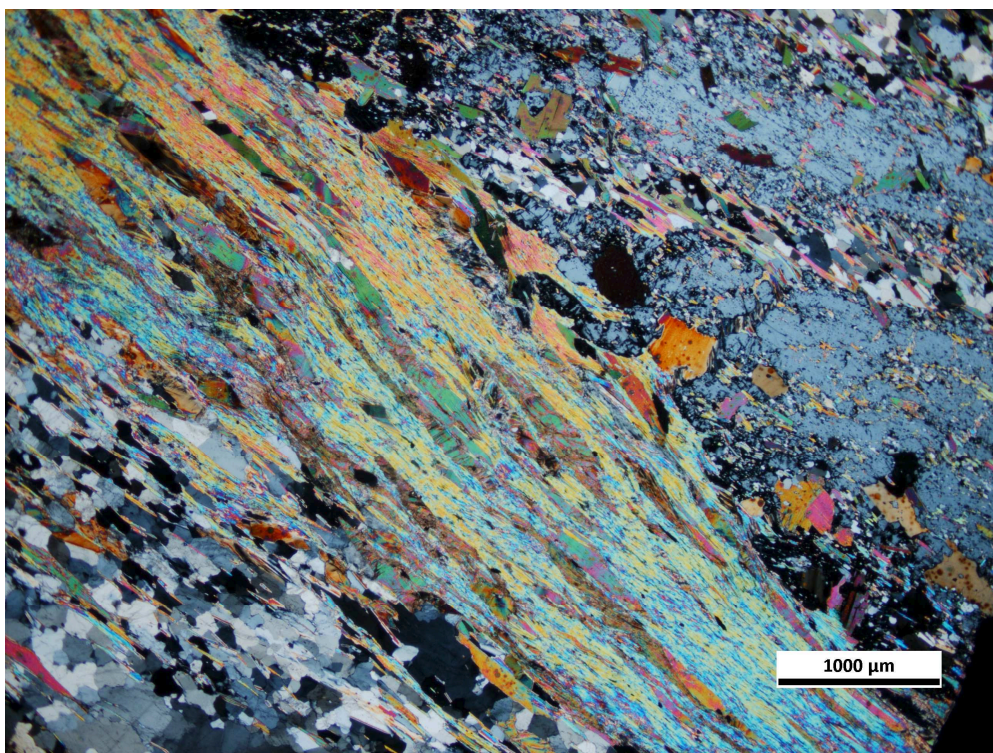
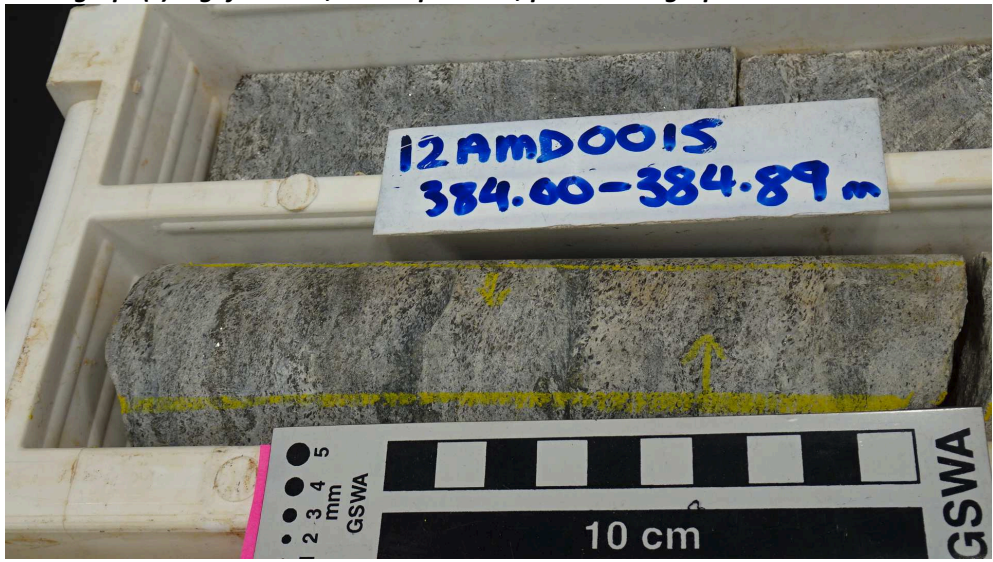
The sample is from basement under Canning Basin sediments and currently assumed to be part of the Yeneena Basin. The metamorphism & foliation age is expected to be Neoproterozoic, corresponding to one of either the

Miles (c. 810 – 650 Ma) [more likely] or Paterson (c. 550 Ma) Orogenies. Sediments of the Yeneena Basin have a maximum depositional age of c. 831 Ma. Due to the contact metamorphic nature of the sample the age is likely to either date metamorphism and deformation, or date exhumation post-dating this event. The granite is assumed to be part of the Crofton Suite; as such the Ar–Ar age is expected to be c. 600–650 Ma or younger.

**Thin section description (if available):**

Medium–coarse-grained, poikiloblastic andalusite schist. Muscovite is more abundant than biotite and together they define a strong but undulating foliation that in part wraps poikiloblasts of elongate andalusite. Quartz and feldspar occur in the matrix. Muscovite occurs as inclusions in andalusite; however, given this rock is considered to represent single-cycle metamorphism, the age of the muscovite inclusions is expected to be similar to or the same as matrix muscovite.

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



**Relevant bibliographic references:**

Towner, RR 1982, Anketell, Western Australia (2nd edition): 1:250 000 Geological Series Explanatory Notes: Geological Survey of Western Australia.  
Gardiner, NJ, Maidment, DW, Kirkland, CL, Bodorkos, S, Smithies, RH and Jeon, H 2018, Isotopic insight into the Proterozoic crustal evolution of the Rudall Province, Western Australia: *Precambrian Research*, v. 313, 31–50.

Maidment, D, Huston, DL, Maas, R, Czarnota, K, Neumann, N, McIntyre, A and Bagas, L 2008, *The Nifty-Kintyre-Duke Cu-U-Pb-Zn mineralizing events: Links to the evolution of the Yeneena Basin, northwest Paterson Orogen*, in *GSWA 2008 extended abstracts: promoting the prospectivity of Western Australia: Geological Survey of Western Australia: Record 2008/2*, p. 27–29.

Bagas, L 2004, *The Neoproterozoic Throssell Range and Lamil Groups, northwest Paterson Orogen, Western Australia - a field guide: Geological Survey of Western Australia, Record 2004/15*, 18p.

Bagas, L and Nelson, DR 2007, *Provenance of Neoproterozoic sedimentary rocks in the northwest Paterson Orogen, Western Australia*, in *Proceedings of the Central Australian Basins Symposium (CABS), Alice Springs, Northern Territory, 16-18 August 2005* edited by TJ Munson, TJ Munson, GJ Ambrose and GJ Ambrose: Northern Territory Geological Survey: Special Publication, p. 1–10.