

- Dawes, P. R. & Soper, N. J. 1970: Geological investigations in northern Peary Land. *Rapp. Grønlands geol. Unders.* **28**, 9-15.
- Escher, A., Escher, J., & Watterson, J. 1970: The Nagssugtoqidian boundary and the deformation of the Kângamiut dyke swarm in the Søndre Strømfjord area. *Rapp. Grønlands geol. Unders.* **28**, 21-23.
- Escher, A. & Pulvertaft, T. C. R. 1968: The Precambrian rocks of the Upernavik-Kraulshavn area (72°-74°15' N), West Greenland. *Rapp. Grønlands geol. Unders.* **15**, 11-14.
- Henriksen, N., & Jepsen, H. F. 1970: K/Ar age determinations on dolerites from southern Peary Land. *Rapp. Grønlands geol. Unders.* **28**, 55-58.
- Keto, L. 1970: Isua, a major iron ore discovery in Greenland. Unpublished report from Kryolitselskabet Øresund A/S, Copenhagen.
- Lambert, R. St. J. & Simons, J. G. 1969: New K/Ar age determinations from southern West Greenland. *Rapp. Grønlands geol. Unders.* **19**, 68-71.
- Larsen, O. & Møller, J. 1968: K/Ar age determinations from western Greenland I. Reconnaissance programme. *Rapp. Grønlands geol. Unders.* **15**, 82-86.
- Sarsadskikh, N. N., Blagul'kina, V. A. & Silin, Yu. I. 1966: Absolute age of Yakutian kimberlites. *Dokl. Acad. Sci. USSR, Earth Sci. Sect.* **168**, 48-50.
- Watterson, J. 1965: Plutonic development of the Ilordleq area, South Greenland. *Bull. Grønlands geol. Unders.* **51** (also *Meddr Grønland*, **172**, 7) 147 pp.
- Wanless, R. K., Stevens, R. D. & Loveridge, W. D. 1970: Anomalous parent-daughter isotopic relationships in rocks adjacent to the Grenville front near Chibougamau, Quebec. *Eclog. geol. Helv.* **63**, 1, 345-364.
- Windley, B. F. 1970: Primary quartz ferro-dolerite/garnet amphibolite dykes in the Sukkertoppen region of West Greenland. In Newall, G. & Rast, N. (editors) *Mechanism of igneous intrusion*, 79-92. Liverpool Geol. Soc.

## SIGNIFICANCE OF K/AR AGE DETERMINATIONS FROM NORTHERN PEARY LAND

**Peter R. Dawes and N. J. Soper**

Following the 1969 field work in northern Peary Land (Dawes & Soper, 1970) seven rocks were chosen for a preliminary age dating programme – two volcanics from the Kap Washington Group, four metasedimentary schists and a single sample from a cross-cutting E-W dolerite dyke. The details of these determinations are listed elsewhere in this report (see p. 53).

Northern Peary Land forms the eastern part of the North Greenland fold belt, which occupies the extreme northern coastal region as a roughly E-W striking belt of deformation and metamorphism. The dated schists represent metamorphic Lower Palaeozoic sediments which form the bedrock in the extreme northern part of Peary Land. Farther south the Lower Palaeozoic sediments are non-metamorphic or only slightly metamorphosed. The sediments in northern Peary Land show a complex metamorphic and deformational history and they have been affected by

at least three episodes of folding. The metasediments are thrust over the Kap Washington Group of bedded lavas and tuffs, which show the effects of mylonitisation and local folding. The effusion of these volcanics post-dates the Palaeozoic diastrophism of the surrounding metasediments, which is regarded as Late Silurian to Pennsylvanian in age; the evidence for this is found in eastern Peary Land where folded Cambro-Silurian rocks are unconformably overlain by less-severely deformed Pennsylvanian to Cretaceous-Tertiary strata of the Wandel Sea basin. The folded and metamorphic Lower Palaeozoic sediments are cut by basic dykes of three main directions, E-W, NE-SW and NNW to NW-SE to SSE, some of which are slightly deformed and recrystallised.

The present dates are somewhat disappointing in that no Palaeozoic ages were obtained from the metasediments, but extremely interesting since they all give Cretaceous-Tertiary age. The ages of  $84.2 \pm 4.2$  m.y. (GGU 53441, on biotite from a staurolite-andalusite-cordierite-garnet-muscovite-biotite schist),  $75.9 \pm 3.6$  m. y. (GGU 53422, on biotite from a muscovite-biotite schist)  $47.1 \pm 2.4$  m.y. (GGU 100624, total rock of chloritoid-muscovite schist) and  $42.3 \pm 4.2$  m.y. (GGU 53427, on muscovite from a muscovite-biotite schist) from the metasedimentary schists indicate that the fold belt has been affected in Late Phanerozoic time by at least one thermal event of regional importance. The dates of  $34.9 \pm 3.5$  m. y. (GGU 53443, total rock) and  $32.3 \pm 3.2$  m. y. (GGU 53452, total rock) on lavas of the Kap Washington Group, are interpreted as giving a maximum age for the thrust movements which resulted in the northerly transport of the metasediments over the volcanics. This thrusting produced crushing and mylonitisation in some of the volcanic rocks and, although the Tertiary dates might refer to initial crystallisation or general cooling of the volcanic pile, the possibility of argon loss in the dated samples due to the later dislocation cannot be ignored.

The dates of 84.2 m. y. and 75.9 m. y. on the schists could refer to a regional metamorphism of Cretaceous age. The mineral assemblage of GGU 53441 suggests a metamorphism of Abukuma type. It is not possible to decide, without supporting age determination work, whether a separate thermal event affected the region in Tertiary time, corresponding to the dates of 47.1 m. y. and 42.3 m. y., or whether these dates are due to a partial argon loss associated with the suggested mid-Tertiary thrust movements.

The date of  $66.0 \pm 6.6$  m. y. (GGU 53487, total rock) on the E-W olivine-bearing dolerite dyke is considered to indicate the approximate time of dyke intrusion. The dyke consists of plagioclase, olivine, sub-ophitic titaniferous augite and a small amount of brown basaltic hornblende, biotite, iron oxide and apatite. The dyke is fresh and, apart from an alteration of olivine, is unmetamorphosed. It cuts across the low-grade metamorphics of the Frederick E. Hyde Fjord region. No basic dyke intersections giving unequivocal age relations, are yet reported from northern Peary Land, but the dykes of all three directions are tentatively considered to be members of a Late Cretaceous suite. A NW-SE trending dolerite dyke in southern Peary Land,

which is probably contemporaneous with the NNW to NW dykes in northern Peary Land, has given a whole rock date of  $72.2 \pm 9$  m. y. which is taken as being close to the time of dyke intrusion (Henriksen & Jepsen, 1970). In places some of the E-W dykes, as well as some of the dykes having the northerly trends, particularly in the north coast region, show a variety of textures which are due to post-magmatic alteration. At these places the dykes show evidence of having been deformed, and the dolerite has recrystallised into a foliated metadolerite and in places a basic schistose rock. Such dykes might lend support for a separate thermal event of Tertiary age, following the Cretaceous regional metamorphism.

The absolute age of the effusion of the Kap Washington Group cannot be conclusively fixed from the dates available. The volcanics are non-metamorphic in a regional metamorphic sense. If the Cretaceous metamorphism suggested by the 84.2 m. y. and 75.9 m. y. dates, was of true regional type and penetrated all levels in the rock sequence, then the non-metamorphic state of the volcanics suggests that the effusion post-dated the thermal maximum of the metamorphism. If so (and even if not) the Kap Washington Group could be of Tertiary age, with the dates of 34.9 m. y. and 32.3 m. y. giving an approximate minimum age of the volcanic consolidation.

## References

- Dawes, P. R. & Soper, N. J. 1970: Geological investigations in northern Peary Land. *Rapp. Grønlands geol. Unders.* **28**, 9-15.
- Henriksen, N. & Jepsen, H. F. 1970: K/Ar age determinations on dolerites from southern Peary Land. *Rapp. Grønlands geol. Unders.* **28**, 55-58.