

BURSARY REPORT – SALLY GIBSON, UNIVERSITY OF CAMBRIDGE



I am extremely grateful to the Mineralogical Society of Great Britain and Ireland for a travel bursary which enabled me to participate as a co-chief scientist, together with Dennis Geist from the University of Idaho, on an expedition to the Galápagos in July/August 2008. The expedition was focused on Santiago which is the fourth largest island in the archipelago. Despite Santiago's size, and the fact that its geology is of important historical significance, it is one of the least studied islands in the archipelago.

Santiago (formerly known as James Island) was the main site of Charles Darwin's fieldwork in the Galápagos (in 1835) and where he formulated many of his ideas on the evolution of species and also, but perhaps less well known, the diversification of igneous rocks. Darwin was the first geologist to notice the importance of crystal settling in magmatic evolution but little is known of the locations on Santiago that gave him particular insight into this process. This is also true of the collection sites of his botanical, ornithological and zoological specimens. As a result of changes in vegetation since Darwin's visit (due to the invasion of goats) and also his limited field notes there has been significant controversy as to where on Santiago he gained his inspiration.

Prior to the expedition I was able to examine Darwin's geological samples from Santiago (mainly basalt and gabbro) that are housed in the Sedgwick Museum at the University of Cambridge. Information gained from these and also his field notebooks enabled us to pinpoint Darwin's geological route on the island. Locating outcrops of specific rock types and providing definitive information on his route proved to be less problematic than previous attempts using fauna and flora. One particularly anomalous sample, a riebeckite-bearing trachyte, was of especial importance as flows of this type only outcrop near the summit of the island. Our study has shown that the rest of the island is composed of alkali and tholeiitic basalts and that the 3000' summit of Santiago appears to be the furthest point that Darwin reached as he travelled inland from the north-west coast. Our findings will be presented in 2009 at conferences marking the bicentenary of Darwin's birth.

Another important aspect of our expedition to Santiago was to collect lava flows from across the island in order to understand more about the formation of the Galápagos archipelago and the cause of active volcanism. Santiago is located 150 km away from the site of the postulated location of the present-day hotspot but still has historic (1759 & 1906) lava flows. Despite the high seas and difficult landing sites, the expedition was extremely successful and samples are now being analysed at the University of Cambridge. We believe that they will provide an important insight into understanding how melt is channelled away from an upwelling mantle plume towards an adjacent spreading ridge.

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